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INTERNATIONAL STANDARDS AND SUSTAINABLE DEVELOPMENT GOAL 7 – AFFORDABLE AND CLEAN ENERGY

Dissertation for Master's Degree

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ABSTRACT

BRANDÃO, Gabriela da Silva. *International Standards and Sustainable Development Goal 7 – Affordable and Clean Energy.* 2020. 124 p. Master of Law. Faculty of Law, University of São Paulo, São Paulo, 2020.

The main purpose of this research is to analyze the relationship between international standards with Sustainable Development Goal 7 - ensure access to affordable, sustainable and modern energy for all, especially investigating if the compliance with elements of plural participation and legitimacy, such as engagement, transparency and accessibility, in the process of international standards' issuance can contribute to the achievement of the SDG 7 and to the dissemination of renewable energies in developing countries. It addresses the evolution of the concept of sustainable development at international level and the implications of sustainable development on international trade, as well as the emergence of the Sustainable Development Goals and specifically the interrelationship between SDG 7 and SDG 17 – partnerships for the goals, which considers the necessary engagement of both public and private actors towards Sustainable Development. Therefore, seeing energy is an important vector for Sustainable Development and taking into account the context of fragmentation of international law and of growing international standardization, the essay discusses the pursuit of international regulatory coherence and analyzes the legitimacy of international standards, focusing primarily in the following elements: engagement, transparency and accessibility. Examining the role of international standards particularly in renewable energy, the research addresses IEC procedures for the development of such standards, providing practical examples of technical committees and standards issued, with a view to analyze to what extent the greater legitimacy of these standards can contribute for the achievement of the SDG 7.

Keywords: Law. International Economic Law. International Trade. International Standards. Legitimacy of International Standards. Sustainable Development. Sustainable Development Goals. SDG 7. SDG 17. Access to Energy. Renewable Energy. ISO. IEC.

RESUMO

BRANDÃO, Gabriela da Silva. *International Standards and Sustainable Development Goal 7 – Affordable and Clean Energy*. 2020. 124p. Mestrado. Faculdade de Direito, Universidade de São Paulo, São Paulo, 2020.

O objeto da presente pesquisa é o relacionamento entre padrões internacionais e o Objetivo de Desenvolvimento Sustentável (ODS) 7 – energia limpa e acessível, investigando se a adoção de elementos de legitimidade no processo de elaboração de tais padrões, tais como participação efetiva, transparência e acessibilidade, pode contribuir para atingir o ODS 7 e para a disseminação de energias renováveis em países em desenvolvimento. Para tanto, aborda-se a evolução do conceito de Desenvolvimento Sustentável na esfera internacional e sua relação com o comércio internacional, bem como o surgimento dos ODS, especialmente a relação entre o ODS 7 e o ODS 17 – parcerias para os objetivos, que considera necessária a ação de agentes públicos e privados para alcançar o Desenvolvimento Sustentável. Assim, partindo da premissa de que energia é um importante fator para o Desenvolvimento Sustentável e considerando o contexto de fragmentação do Direito Internacional e de constante padronização internacional, a dissertação discute a busca por coerência regulatória internacional e analisa a legitimidade dos padrões privados, focando primordialmente nos elementos de participação efetiva, transparência e acessibilidade. Ao examinar o papel dos padrões internacionais particularmente em energias renováveis, a pesquisa aborda os procedimentos da IEC para o desenvolvimento de tais padrões, apresentando exemplos práticos de comitês técnicos e padrões editados, com vistas a analisar em que medida a maior legitimidade desses padrões pode contribuir para atingir o ODS 7.

Palavras-chave: Direito. Direito Econômico Internacional. Comércio Internacional. Padrões Internacionais. Legitimidade de Padrões Internacionais. Desenvolvimento Sustentável. Objetivos de Desenvolvimento Sustentável. ODS 7. ODS 17. Acesso à Energia. Energias Renováveis. ISO. IEC.

TABLES LIST:

ABBREVIATIONS

ABNT – Brazilian National Standards Organization (Associação Brasileira de Normas Ténicas)

ACAS – Affiliate Conformity Assessment Status

ACEA – Advisory Committee on Environmental Aspects

AhG – Ad Hoc Group

CA – Conformity Assessment

CEU – Council of The European Union

CHF – Swiss Franc

CTE – Committee on Trade and Environment

DEVCO – ISO's Developing Countries Committee

EMIT Group – Working Group on Environmental Measures and International Trade

EC – European Commission

EU – European Union

FAO – Food and Agriculture Organization for the United Nations

FGV – Getúlio Vargas Foundation (Fundação Getúlio Vargas)

FIESP – São Paulo's Industrial Federation (Federação das Indústrias do Estado de São Paulo)

GATT – General Agreement on Tariffs and Trade

IBRD – International Bank for Reconstruction and Development

IEA – International Energy Agency

IEC – International Electrotechnical Commission

IECEE – IEC System for Conformity Testing and Certification of Electrotechnical Equipment and Components

IECEx – Certification of Equipment operated in explosive atmospheres

IECQ – IEC System of quality of electronic components, materials and processes

IECRE – IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Systems

IISD – International Instituto for Sustainable Development

ILA – International Law Association

ILO – International Labor Organization

IRENA – International Renewable Energy Agency

ISEAL – International Social and Environmental Accreditation and Labelling

ISO – International Organization for Standardization

ITC – International Trade Centre

ITU – International Telecommunication Union

IUCN – International Union for Conservation of Nature and Natural Resources

JWG – Joint Working Group(s)

MDG – Millennium Development Goals

NAFTA – North American Free Trade Agreement

NEC – National Electrotechnical Committee

NGOs – Non-governmental Organizations

NSMD – Non-state market driven

ODA – Official Development Assistance

OECD – Organization for Economic Cooperation and Development

O-members – National Committees which follow IEC's TC/SC as observer

PIC Convention – 1998's Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

P-members – National Committees which participate actively in the work of IEC's TC/SC

PAS – Publicly Available Specifications

POP Convention – 2001's Persistent Organic Pollutants

PPM – Process or production method

PROCEL – Brazilian National Program for Conservation of Electric Energy (Programa Nacional de Conservação de Energia Elétrica)

PV – Photovoltaic

Rio+20 – United Nations Conference on Sustainable Development

SC – Subcommittee(s)

SDG – Sustainable Development Goals

SEforAll – Sustainable Energy for All

SMB – Standardization Management Board

SPS – Sanitary and Phytosanitary Measures

SRI – Socially Responsible Investment

TC – Technical Committee(s)

TBT – Technical Barriers to Trade Agreement

TPP – Trans-Pacific Partnership

UK – United Kingdom

UN – United Nations

UNCED – United Nations Conference on Environment and Development

UNCTAD – United Nations Conference on Trade and Development

UN DESA – United Nations Department of Economic and Social Affairs

UN ECE – United Nations Economic Commission for Europe

UN ECOSOC – United Nations Economic and Social Council

UNEP – United Nations Environment Program

UN ESCAP – United Nations Economic and Social Commission for Asia and the Pacific

UNESCO – United Nations Educational, Scientific and Cultural Organization

UNFSS – United Nations Forum on Sustainability Standards

UNIDO – United Nations Industrial Development Organization

UN ILC – United Nations International Law Commission

UNITAR – United Nations Institute for Training and Research

UNSD – United Nations Statistics Division

UNSDG – United Nations Sustainable Development Group

UNSSC – United Nations System Staff College

US – United States of America

VSS – Voluntary Sustainability Standards

WB – The World Bank Group

WECD – World Commission on Environment and Development

WEHAB Agenda – Water and Sanitation, Energy, Health, Agricultural Productivity and Biodiversity

WG – Working Group(s)

WHO – World Health Organization

WTO – World Trade Organization

WWF – World Wildlife Fund

SUMMARY

INTRODUCTION

Even though sustainable development does not constitute a recent concept on international agreements and the international community's concern about environmental protection is not new, United Nations (UN) set 17 Sustainable Development Goals (SDGs), better detailed in 169 specific targets, that might be achieved until 2030 with the purpose of eradicating extreme poverty and promoting sustainable development of the countries.

Among those 17 SDGs is the objective number 7, which aims to ensure access to affordable, reliable, sustainable and modern energy for all, considering that energy plays an important role in the achievement of sustainable development globally. Indeed, the pursuit of universal access to energy is very relevant in the fight against extreme poverty, as well as renewable energy and energy efficiency are able to contribute to the achievement of sustainable development.

Energy is a very relevant issue, since it can be considered an exportable commodity, and, also, an important input for the most diverse means of production – from agribusiness to complex industrial activities. It also provides essential services to satisfy basic human needs, as conserving food, cooking meals, heating and cooling and providing means of transportation. Besides, since information is a very valuable asset nowadays and considering that network connections and databases depend on electricity, this is a relevant question for the development of countries and businesses.

That is why lack of electricity affects health, education and businesses, as it will be demonstrated through this research, and it affects around 840 million people who still do not have access to energy. Moreover, almost 3 billion people lack access to clean cooking fuels, resulting in nearly 4 million premature deaths each year, according to UN reports.

Considering the challenge of ending energy poverty, the need of engagement of both public and private actors towards sustainable development, as well as the interlinkage among the goals, the SDG 17 aims to foster global partnerships towards the SDGs' achievement.

That is why this research discusses the increasing relevance of private actors in global governance and of international standards in the energy sector and, particularly, in the renewable energies deployment, focusing on the relationship between international standards and the achievement of SDG 7.

With that in mind, the main purpose of this research is to investigate if the compliance with elements of plural participation and legitimacy, such as engagement, transparency and accessibility, in the process of international standards' issuance can contribute to the achievement of the SDG 7 and to the dissemination of renewable energies in developing countries.

Thus, in Chapter 1, the evolution of the concept of sustainable development in international law is briefly mentioned, in order to address, in Chapter 2, the emergence of the 17 Sustainable Development Goals and the specific targets of SDG 7, considering energy as a vector of development, as well as its connection with SDG 17 – Partnerships for the Goals, which calls private actors and civil society to contribute to the achievement of the SDGs.

Chapter 3 addresses the pursuit for international regulatory coherence and the vast doctrinal discussion about private governance and international standardization, presenting to the readers the concepts used in this research.

Legitimacy of international standards is also an object of the third Chapter, where it is possible to identify that three elements of legitimacy are particularly relevant for international standard setting procedures: engagement, transparency and accessibility. These are the main elements that guide this research.

International standardization on energy and its role in renewable energy and the specific International Electrotechnical Commission (IEC) procedures for the development of international standards on renewable energy are object of Chapter 4, especially considering if developing countries are adequately considered.

Among the findings of this research are several initiatives with the objective to increase the legitimacy and the participation of developing countries in the standards-setting process, such as (i) TBT's Code of Good Practice for the Preparation, Adoption and Application of Standards, (ii) ISEAL Code of Good Practice and Credibility Principles, (iii)

ISO's Developing Countries Committee – DEVCO and (iv) IEC Affiliate Country Programme.

Nevertheless, while ensuring greater participation and transparency to the international standard-setting procedures, as well as the access to them, are measures that can enable the achievement of SDG 7 targets, there are several obstacles for developing countries to effectively participate, contribute and adopt international standards, that will be addressed in this research.

In conclusion, it is possible to assert that international standards can contribute to the development of countries, to increase the access to energy and, specifically, to renewable energies only if the standard-setting procedures observes the elements of legitimacy studied herein: engagement, transparency and access. In this sense, the result of this research presents recommendations of other effective measures that may help international standard-setting procedures to contribute to the effective achievement of the SDG 7.

1. BRIEF NOTES ON THE EVOLUTION OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT IN INTERNATIONAL LAW

Since sustainable development concept has evolved over the decades in the international area, this Chapter discusses how this evolution occurred and contextualizes the relationship between sustainable development and international trade, a relevant issue for this research.

1.1. THE EVOLUTION OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT AT INTERNATIONAL LEVEL

Sustainable development does not constitute a recent concept on international agreements as well as the international community's concern about environmental protection is not new.

As BRATSPIES (2011) affirms, *"the problem of sustainability did not suddenly spring, fully formed, into the international arena"*. Indeed, SACHS (2015) mentions that *"the term 'sustainable' as applied to the ecosystems goes back a long way"*, exemplifying that fisheries managers have long used the concept of 'maximum sustainable yield' regarding to the amount of fish caught per year consistent with a stable fish population.

SACHS (2015) affirms, though, that the challenge of maintaining sustainability in the context of economic growth and development was first brought to the global forefront in the UN Conference on the Human Environment in Stockholm, in 1972, and AMARAL JÚNIOR (2015) points out that the concept of sustainable development was already implicit on Stockholm Declaration.

Likewise, DUPUY AND VIÑUALES (2015) mention that the Resolution 2398 (XXIII), adopted by the UN General Assembly in December 1968, which led to the 1972's UN Conference on Human Environment, was already one of various international initiatives that expressed the international concern about the relationship between environmental protection and economic development, what was also object of principles 8, 9, 10, 11 and 12 of the Stockholm Declaration.

The World Conservation Strategy, prepared by the International Union for Conservation of Nature and Natural Resources (IUCN), with assistance of the UN Environment Programme (UNEP), the World Wildlife Fund (WWF), the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Educational, Scientific and Cultural Organization (Unesco), in 1980, used the expression 'sustainable development' (DUPUY; VIÑUALES, 2015).

IUCN (1980) stressed the mutually dependency between conservation and sustainable development, and stated:

> *Conservation must therefore be combined with measures to meet short term economic needs. The vicious circle by which poverty causes ecological degradation which in turn leads to more poverty can be broken only by development. But if it is not to be self-defeating, it must be development that is sustainable - and conservation helps to make it so.*

Sustainable development was implicitly considered in the World Charter for Nature, proclaimed by United Nation's General Assembly Resolution A/RES/37/7, in 1982, which expressed the international concern about natural resources exploitation and its compatibility with economic development and ecosystems conservation for present and future generations (AMARAL JÚNIOR, 2015). Thus, aiming international cooperation in this matter, the Charter stablished principles of conservation that should be followed worldwide. Its objectives are described in the excerpts below (UN, 1982):

> *7. In the planning and implementation of social and economic development activities, due account shall be taken of the fact that the conservation of nature is an integral part of those activities.*
>
> *8. In formulating long-term plans for economic development, population growth and the improvement of standards of living, due account shall be taken of the long-term capacity of natural systems to ensure the subsistence and settlement of the populations concerned, recognizing that this capacity may be enhanced through science and technology.*

Also, in the same year, the UN General Assembly adopted the UN Convention on the Law of the Sea, which, together with other provisions, devoted its whole Part XII to marine environment conservation (DUPUY; VIÑUALES, 2015).

In 1983, through UN General Assembly's Resolution A/RES/38/161, a Special Commission was welcomed, which later came out to be named after World

Commission on Environment and Development (WCED) or Brundtland Commission (UN, 1983).

The final report of this Commission was issued in 1987 – 'Report of the World Commission on Environment and Development: Our Common Future' – and emphasized, as well, the relationship between economic development and environmental protection (UN, 1987). It also defined sustainable development as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*[1].

Nevertheless, UN (1987) quoted a contribution received at the WCED Public Hearing held in Ottawa, in 1986, in the sense that *"arriving at a commonly accepted definition of 'sustainable development' remains a challenge for all the actors in the development process"*.

After detailing the various aspects that composes the notion of sustainable development, the Brundtland Commission report affirmed (UN, 1987):

> *In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.*

However, it was in the Rio Declaration on Environment and Development (UN, 1992b) and in other documents signed during the UN Conference on Environment and Development, held in Brazil in 1992, that the concept of sustainable development was enshrined, as AMARAL JÚNIOR (2015) states.

As it is possible to see, and DUPUY and VIÑUALES (2015) highlighted, since Stockholm Declaration, the center of gravity has shifted from environmental protection itself to the relationship between the latter and development issues. Therefore, the previously cited authors concluded that *"the Rio Declaration strikes a fair balance between the often competing terms of the environment-development equation"*.

[1] AMARAL JÚNIOR (2015), DUPUY and VIÑUALES (2015) and SACHS (2015), among other authors, also recognize the importance of the Bruntland Commission's final report for the concept of sustainable development.

Indeed, the will for compatibility between economic development and environmental protection appears on principles 3 and 4 of the Rio Declaration (UN, 1992b), as stated below:

> *Principle 3*
>
> *The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.*
>
> *Principle 4*
>
> *In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.*

Principle 12 addresses specifically the relationship between sustainable development and international trade[2] and, in the end, the Rio Declaration admitted the interdependency and indivisibility of the following concepts: peace, development and environmental protection in a global context[3].

Agenda 21 (UN, 1992a), also a result of the UN Conference on Environment and Development, detailed the main goals settled in 1992, stablishing 'programme areas' and their specific objectives, activities and means of implementation. Among them, it is possible to identify, in Chapter 2 – 'International Cooperation to Accelerate Sustainable Development in Developing Countries and Related Domestic Policies', a great concern about harmonizing economy development and environmental sustainability in the international agenda.

Illustratively, it is possible to mention the Programme Area B – 'Making Trade and Environment Mutually Supportive Basis for Action', where the following is stated:

> *2.19. Environment and trade policies should be mutually supportive. An open, multilateral trading system makes possible a more efficient allocation and use of*

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[2] *"States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on an international consensus."*

[3] DUPUY and VIÑUALES (2015) also addressed the evolution of the concept of sustainable development at international level.

> *resources and thereby contributes to an increase in production and incomes and to lessening demands on the environment. It thus provides additional resources needed for economic growth and development and improved environmental protection. A sound environment, on the other hand, provides the ecological and other resources needed to sustain growth and underpin a continuing expansion of trade. An open, multilateral trading system, supported by the adoption of sound environmental policies, would have a positive impact on the environment and contribute to sustainable development.*
>
> *2.20. International cooperation in the environmental field is growing, and in a number of cases trade provisions in multilateral environment agreements have played a role in tackling global environmental challenges. Trade measures have thus been used in certain specific instances, where considered necessary, to enhance the effectiveness of environmental regulations for the protection of the environment. Such regulations should address the root causes of environmental degradation so as not to result in unjustified restrictions on trade. The challenge is to ensure that trade and environment policies are consistent and reinforce the process of sustainable development. However, account should be taken of the fact that environmental standards valid for developed countries may have unwarranted social and economic costs in developing countries.*

It is feasible to say, therefore, that the Agenda 21 also reaffirmed the interdependency between environment and development by relating trade and sustainable development in the above quoted texts. As a result, it was defined that it should be developed an environment / trade and development agenda in the international field.

Later, in December 2000, the UN General Assembly decided to organize a third major conference, which was held in Johannesburg and took place from August to September 2002. The focus of the World Summit on Sustainable Development became to be known as 'WEHAB Agenda' (water and sanitation, energy, health, agricultural productivity and biodiversity).

The Conference led to the Johannesburg Declaration on Sustainable Development, which emphasized a third dimension of the concept of sustainable development: the social (DUPUY; VIÑUALES, 2015).

In this sense, SACHS (2015) mentions that the current sense of the concept of sustainable development is a *"three-way normative framework, embracing economic development, social inclusion and environmental sustainability".*

DUPUY and VIÑUALES (2015) also highlighted that the political declaration of the Johannesburg Summit has clarified the concept of sustainable development used until then, especially in its paragraph 5, according to which *'economic*

development, social development and environmental protection constitute the interdependent and mutually reinforcing pillars of sustainable development".

Furthermore, DUPUY and VIÑUALES (2015) affirmed that, shortly before, the International Law Association (ILA) had adopted the 'New Delhi Declaration on the Principles of International Law Related to Sustainable Development' which, in its preamble, formulated the programme conveyed by the concept of sustainable development as:

> *a comprehensive and integrated approach to economic, social and political processes, which aims at the sustainable use of natural resources of the Earth and the protection of the environment on which nature and human life as well as social and economic development depend and which seeks to realize the right of all human beings to an adequate living standard on the basis of their active, free and meaningful participation in development and in the fair distribution of benefits resulting therefrom, with due regard to the needs and interests of future generations.*

However, DUPUY and VIÑUALES (2015) concluded that *"the question of whether sustainable development can operate as a primary norm is still unsettled in general international law"*.

Twenty years after the UN Conference on Environment and Development (UNCED), another Summit was held in Rio de Janeiro, the UN Conference on Sustainable Development (Rio+20), with focus on economic and social development, but it also highlighted the *"respect for nature"* and the *"protect[ion] of our common environment"* (DUPUY; VIÑUALES, 2015). As mentioned by DUPUY and VIÑUALES (2015), its outcome document, 'The Future We Want', confirmed the shift towards developmental concerns, signaled by the Johannesburg Summit. And the authors added:

> *Despite the environmental significance of these and other elements, the 2012 Rio Summit tilted the balance between the two terms of the environmental-development equation laboriously struck at the 1992 Rio Summit. Social and economic development is no longer seen as 'one' overarching objective of sustainable development, but as 'the' main challenge. As noted by the outcome document, 'poverty eradication is the greatest global challenge facing the world today and an indispensable requirement for sustainable development'.*

Therefore, it is possible to conclude that the concept of sustainable development has significantly evolved in international law since its initial appearances, in the 1970s/1980s, from the environmental protection itself to the complex ensemble of environmental protection, social and economic development, as it is considered nowadays.

Another relevant change was the shift from the view that environmental protection and economic and social development would be conflicting elements to a more synergistic view of the components of sustainable development. The latter view will guide this research.

1.2. GLOBALIZATION, INTERNATIONAL TRADE AND SUSTAINABLE DEVELOPMENT

To investigate and analyze the relationship between sustainable development and international trade, it is important to understand that such relationship occurs in a context of deep globalization.

In this sense, FARIA (2010) affirms that globalization is an open and multiform concept which denotes the overlap of international over national practices and, because of its polysemic nature, globalization is often a rather imprecise - and therefore misleading - concept that has been used by both the press and the academic universe over two or three decades to designate – as fatal or inexorable – the most varied phenomena.

FARIA (2010) adopts the premise that globalization is a multi-causal, multidimensional, multitemporal and multicentric process that relativizes national scales while expanding and intensifying economic, social and political relations.

The author also mentions that globalization implies the free movement of goods, services, technology and information, the intensification of social relations and the increase in the geographical coverage of locally relevant social interactions and highlights the integration of markets on a world scale (FARIA, 2010, 2017).

Hereupon, it is important to remark that SACHS (2015) wrote about the emergence of a new era of globalization', soon after World War II, in the context of a new 'catch-up growth' that took off in countries that opened their national borders to trade and foreign investment, in a context of global value chains. In addition, the author affirmed:

> *New global production systems, centered around large multinational companies, used the poorer countries as places for low-wage, labor-intensive parts of their production systems. The global value chain of production (for a car, a shirt, a home computer for global sales) was increasingly divided up among many countries to*

> *take advantage of different wage levels, local skills, and transport conditions. Poor countries were able to become part of global production systems when they offered good infrastructures, transport, and low-cost and reasonably skilled labor.*

SACHS (2015) also pointed out that "*the world's large multinational companies thereby became the mains agents for the continuing transmission of economic ripples around the world and the diffusion of modern economic growth".*

Likewise, FARIA (2017) approached the scenario of significant mobility granted to economic and social actors by the integration of markets on an international scale, in a context in which traditional borders no longer define the contours of territorial sovereignty, ideas of citizenship and state monopoly in the definition of political community. When addressing the internationalization of production chains, the mentioned author stated (in a free translation):

> *Finally, it is the scenario of the internationalization of production chains, in which the production units located in a given country are not limited to supplying the local market, but also serve as a supply base for other global units. As a result, conflict management and decision-making are beginning to require intricate deterritorialization strategies and innovative procedures for organizing the political space. With the range, comprehensiveness and intensity of globalization, economic relations tend to escape or get away from national regulatory jurisdictions.*

The relationship among globalization, international trade and economic development of national states is also object of study of other authors. RODRIK (2009), for instance, approaches positive and negative aspects of globalization, affirming:

> *Globalization – by which I mean enhanced trade and financial integration – poses both opportunities and challenges to the mixed economy. On the plus side, the global expansion of markets promises greater prosperity through the channels of division of labor and specialization according to comparative advantage. This opportunity is of particular significance to developing countries, since it allows them access to state-of the-art technology and cheap capital goods on world markets. But globalization also undercuts the ability of nation-states to erect regulatory and redistributive institutions, and does so at the same time that it increases the premium on solid national institutions.*

RODRIK (2009) also admits that there has never been controversy about the purpose of the world trade regime to raise living standards all around the world, rather than exclusively maximizing international trade. On the other hand, he states that *"these two goals – promoting development and maximizing trade – have come to be viewed as synonymous by the WTO and multilateral lending agencies, such that the latter substitutes for the former".*

Likewise, RODRIK (2009) remarks that global integration is still a key prerequisite for economic development, but he points out that there is a lot more than just *"throwing the borders open"*, since that getting the gains from this act requires a full complement of institutional reforms. Additionally, he states that the world trading regime must shift from a 'market access mind-set' to a 'development mind-set', and advocates:

> *A shift to a real developmental mind-set in trade negotiations would have several important advantages. The first, and the most obvious one, is that this would provide for a more development-friendly international economic environment. Countries would be able to use trade as a means for development, rather than being forced to view trade as an end in itself (and being forced to sacrifice developmental goals in the bargain). It would save developing countries precious political capital by obviating the need to bargain for "special and differential treatment"—a principle that in any case is more form than substance at this point.*

The concern about a sustainable trade regime is either addressed by RODRIK (2009) when arguing that an extension of safeguards to cover environmental, labor, and consumer safety standards or developmental priorities at home would increase the legitimacy and resilience of the world trading system and render it more development-friendly.

When addressing the 'democratic deficit' of globalization, STIGLITZ (2007) affirms that the international institutions which conduct the global economy only reflect the interests of the *"advanced industrial countries – or, more particularly, special interests (like agriculture and oil) within those countries"* to the detriment of the poorest countries, concluding that in order to make globalization work, it is essential to have an international economic regime in which the well-being of the developed and developing countries are better balanced, calling it *"a new global social contract between developed and less developed countries".*

While considering the positive and negative effects of trade liberalization, AMARAL JÚNIOR and MESQUITA (2017) approached specifically the relationship between international trade and environmental protection, affirming that *"there is an inseparable link between international trade and environmental protection in the pursuit of sustainable development".* In this regard, the quoted authors advocated that environment and trade policies need to support each other.

AMARAL JÚNIOR and MESQUITA (2017) also related that, even though international environmental law started to be consolidated in the 1960s, the first valuable

initiative to incorporate environmental provisions into the world trading system was the Uruguay Round, which took place between 1986 and 1994, highlighting the coincidence of dates with the accomplishment of the Rio Conference on Environment and Development and arguing:

> *Throughout time, international trade and the environmental protection have followed different paths, rarely crossing their sphere. Both fields had different logics and principles to address particular problems. However, due to the swift depletion of natural resources deriving from the industrialization process, the environmental protection became a political sensitive issue mobilizing both societies and governments to enhance the interaction between trade and the environment.*

DUPUY and VIÑUALES (2015) approached the historical relationship between international trade and environmental protection as well:

> *The failed 1948 Havana Charter and even its predecessor, the 1927 Convention for the Abolition of Import and Export Prohibitions and Restrictions, both contained explicit exceptions to accommodate what today would be called environmental measures. The question arose again in the run-up to the Stockholm Conference and, in 1971, it led to the creation by the States parties to the GATT of a 'Working Group on Environmental Measures and International Trade' ('EMIT Group'), which was to remain inactive until the 1992 Earth Summit. Indeed, it was not until the early 1990s that the debate was reignited as a result of different interlinked processes including the dispute between Mexico and the United States over imports of tuna, the negotiation of the North American Free Trade Agreement ('NAFTA'), the process leading to the Earth Summit and, of course, the Uruguay trade round concluded in 1994.*
>
> *The establishment of the WTO brought a number of environmentally significant advances, including the introduction of a reference to sustainable development in the preamble of the Marrakesh Agreement and the adoption of a Ministerial Decision on Trade and Environment, setting up the Committee on Trade and Environment ('CTE') in lieu of the dormant EMIT Group. The CTE has contributed to the clarification of the trade/environment interface through discussions and studies, and it has fostered interactions between trade and environment officials at the national and international levels. Over time, environmental considerations have grown in importance within the WTO context, as acknowledged by the 'trade and environment' work programme envisioned in the 2001 Ministerial Declaration launching the Doha negotiation round.*

Notwithstanding, although DUPUY and VIÑUALES (2015) admit that environmental concerns are more present nowadays in the international agenda than decades ago, they affirm that the environmental-development equation remains unsolved and argue that perhaps the most important intellectual frontier in contemporary international environmental law is to move beyond the answers provided by the broad concept of sustainable development.

DUPUY and VIÑUALES (2015) also addressed the *"developing country distrust towards environmental considerations",* which early appeared in the UN's General Assembly Resolution 2849 (XXVI) of 1971 and, more recently, in Principle 12 of the Rio Declaration and Chapter 2 of Agenda 21, while addressing the *"concern expressed by developing countries that environmental regulation may be used to curtail market access to their exports*".

That is why is possible to conclude that the environment-development axis always oscillated between conflict and synergy, which is also an object of both the World Trade Organization (WTO) Agreement and the analysis of the herein cited authors.

DUPUY and VIÑUALES (2015), for instance, mention the use of expressions such as 'mutual supportiveness' and 'sustainable development' as a synergistic connection between environmental treaties and trade disciplines, as it is possible to see in the preambles of the 1998's Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade – PIC Convention, the 2000's Biosafety Protocol, the 2001's International Treaty on Plant Genetic Resources for Food and Agriculture, the 2001's Persistent Organic Pollutants – POP Convention and articles 20 of the 2005 UNESCO Convention on Cultural Diversity and 4 of the 2010 Nagoya Protocol.

Indeed, the interconnection between international trade, economic development and sustainable development has been an object of reflection within UN, such much so that the Report of the WCED from 1987 – 'Our Common Future' recognizes that *"trade has made nations, economically and ecologically, more interdependent".* UN (1987) also states:

> *The main link between trade and sustainable development is the use of non-renewable raw materials to earn foreign exchange. Developing countries face the dilemma of having to use commodities as exports, in order to break foreign exchange constraints on growth, while also having to minimize damage to the environmental resource base supporting this growth. There are other links between trade and sustainable development; if protectionism raises barriers against manufactured exports, for example, developing nations have less scope for diversifying away from traditional commodities. And unsustainable development may arise not only from overuse of certain commodities but from manufactured goods that are potentially polluting.*

This issue is also presented in principle 12 of the Rio Declaration on Environment and Development (UN, 1992b), previously cited, as well as in the document

entitled ‘The Future We Want’, adopted in the Rio+20 (UN, 2012), which highlighted the three dimensions of sustainable development – economic, social and environmental – and registered the UN commitment to *“work together to promote sustained and inclusive economic growth, social development and environmental protection and thereby to benefit all”.* UN (2012) also states:

> *We reaffirm that international trade is an engine for development and sustained economic growth, and also reaffirm the critical role that a universal, rules-based, open, non-discriminatory and equitable multilateral trading system, as well as meaningful trade liberalization, can play in stimulating economic growth and development worldwide, thereby benefiting all countries at all stages of development as they advance towards sustainable development.*

In connection with the inseparability of the three pillars of sustainable development – social, economic and environmental development – UNEP defines green economy as an economy that results in improved human well-being and social equity while significantly reducing environmental risks and ecological scarcities (IISD; UNEP, 2014).

Therefore, recognizing the relevance of Rio+20 for this concept of green economy, the ‘Trade and Green Economy – A Handbook’, a joint publication of IISD and UNEP (2014), states that:

> *The Rio+20 outcome document, The Future We Want, focuses on the green economy, institutions and implementation. It recognizes the green economy, in the context of sustainable development and poverty eradication, as one of the most important tools for achieving sustainable development and calls for assistance for countries seeking to transition to greener economies. The Rio+20 outcome also calls for stronger international cooperation on finance, debt, trade and technology. This includes better cooperation among institutions within the United Nations system, and with the WTO. Rio+20 recognizes international trade as an engine for development and sustained economic growth, and calls for progress on trade-distorting subsidies and trade in EGS.*

IISD and UNEP (2014) also highlighted that world leaders at the Rio+20 Conference embraced this notion by defining international trade as *“an engine for development and sustained economic growth”*, adding:

> *While the pre-Rio debate focused on many developing countries’ concerns about the risks of countries using green economy policies as a pretext for protectionist measures, it could be argued that Rio+20 broadened the focus of the trade and green economy debate to also consider the opportunities that green economy measures can bring to developing countries in terms of development, market creation and access, employment, and sustainability.*

As well, IISD and UNEP (2014) adopt as a fundamental truth about the relationship between international trade and environment that:

> *Trade liberalization as such is neither good nor bad for the environment. Its effects on the environment depend on the extent to which environment and trade goals can be made complementary and mutually supportive. A positive outcome requires appropriate supporting social, economic and environmental policies at the national and international levels.*

In this sense, it is acknowledged that the interaction between these two areas of international law is inevitable and, besides, that, when accompanied by appropriate regulation, international trade can play a key role in the transition to a green economy, by fostering the exchange of environmentally friendly goods and services and by effectively seizing the benefits of interstate synergies.

Besides, the reduced barriers to international trade, investment flows and innovative technologies have driven the trend toward globalization and the global expansion of free trade, as well as the rise of the BRIC (Brazil, Russia, India and China) have contributed to the decrease in global poverty (IISD; UNEP, 2014)[4].

BRATSPIES (2011), on the other hand, considers that:

> *New technologies continually bring the growing divergence between market incentives and social welfare into sharp context. As a society, we often turn to law and regulation to bridge that divergence, yet the wide gap between the varying sustainability laws as adopted and society's actual sustainable practices undermines that instinct.*

Thus, it is possible to deduce that the advancement of globalization and the frequent *transterritorialization* of the means and chains of production, as well as the overcoming of national borders in international trade system in the pursuit of lower costs of production affect national states, create incentives for the growing exploitation of natural resources and the construction of appropriate infrastructure to supply goods for foreign markets.

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[4] In this sense, the trade and green economy – a handbook also notices that *"As an indicator of a reduced development gap, South-South trade has increased to roughly half of developing countries' goods and services exports. Some developing countries are also equalling developed countries in strategically vital economic indicators, such as renewable energy investment".*

Additionally, the constant development of new technologies makes it increasingly possible to find new sources of renewable energy and expand the existing ones at different costs, with the potential to benefit countries at different stages of development.

Therefore, it is undeniable that this movement is intimately related to sustainable development, since it directly affects all three of its aspects: economic, social and environmental.

Presently, as all before mentioned authors and institutions recognize, we live in a very globalized, interconnected and interdependent world, where achieving a sustainable development must be a concern and a goal for all sorts of countries, regardless of which stage of development they are.

Therefore, it is feasible to conclude that there are relevant concerns about granting universal access to energy, fostering of renewable sources of energy and developing of energy efficiency as propelling factors to the achievement of concrete sustainable development.

2. SUSTAINABLE DEVELOPMENT GOALS

To better discuss the relationship between SDG 7 and international standards, the UN's goal of granting universal access to energy and expanding renewable energy needs to be contextualized. Therefore, this Chapter explains the origin of SDGs, the relevance of energy for sustainable development and also the objectives of SDG 7 and its relationship with SDG 17 – partnerships for the goals.

In the context of the growing concern about sustainable development internationally, the UN Millennium Declaration, adopted by the UN General Assembly by Resolution A/RES/55/2, in 2000, reaffirmed the support for the principles of sustainable development, including those set out in Agenda 21 and recognized shared responsibility, on international level, for managing worldwide social and economic development, as well as for environmental protection (UN, 2000).

The UN established, then, eight Millennium Development Goals (MDGs), which were expected to contribute for the elimination of extreme poverty in the world until 2015, which were: (i) eradicate extreme poverty and hunger, (ii) achieve universal primary education, (iii) promote gender equality and empower women, (iv) reduce child mortality, (v) improve maternal health, (vi) combat HIV/AIDS, malaria and other diseases, (vii) ensure environmental sustainability, and (viii) global partnership for development.

The World Summit on Sustainable Development was held in Johannesburg in 2002, ten years after the UN Conference on Environment and Development as a follow-up to the previous Conference and, later, in 2012, the Rio+20 took place in Rio de Janeiro. There, the UN General Assembly adopted the Resolution A/RES/66/288, which reaffirms the commitment to sustainable development (UN, 2012).

The before-mentioned document, entitled ‘The Future We Want’, also registers the commitment of its participants to *“work together to promote sustained and inclusive economic growth, social development and environmental protection and thereby to benefit all”* and affirmed UN (2012):

> *12. We resolve to take urgent action to achieve sustainable development. We therefore renew our commitment to sustainable development, assessing the progress to date and the remaining gaps in the implementation of the outcomes of the major summits on sustainable development and addressing new and emerging challenges. We express our determination to address the themes of the United Nations Conference on Sustainable Development, namely, a green economy in the context of sustainable development and poverty eradication, and the institutional framework for sustainable development.*

In SACHS (2015) words, the findings of the Rio+20 Summit were 'unsettling':

> *"All of the evidence showed that the diagnosis first made back in 1972 was fundamentally correct: the challenges of combining economic growth with social inclusion and especially environmental sustainability were still unmet, and indeed were intensifying."*

Indeed, since the previously mentioned MDGs could not be fully achieved, as recognized in 2015's MDG final report (UN, 2015c), the UN approved, unanimously, in the same year, the Resolution A/RES/70/1 – Transforming our World: The 2030 Agenda for Sustainable Development, which, transitioning from the MDGs (SACHS, 2015), set 17 SDGs, better detailed in 169 specific targets, that might be achieved until 2030 with the purpose of eradicating extreme poverty and promoting sustainable development of the countries.

UN SDGs are, successively: (i) no poverty, (ii) zero hunger, (iii) good health and well-being, (iv) quality education, (v) gender equality, (vi) clean water and sanitation, (vii) affordable and clean energy, (viii) decent work and economic growth, (ix) industry, innovation and infrastructure, (x) reduced inequalities, (xi) sustainable cities and communities, (xii) responsible consumption and production, (xiii) climate action, (xiv) life below water, (xv) life on land, (xvi) peace, justice and strong institutions and (xvii) partnerships for the goals.

SACHS (2015) considered that the call for SDGs is a potentially historic decision and a powerful way to move to a new global agenda engaging the world community, not only governments, but all stakeholders involved with those issues. He also compared SDGs to MDGs, affirming:

> *Unlike the MDGs, which apply largely to poor countries and reference the rich countries mainly as donors, the SDGs will be universally applicable. The United States, just like Mali, needs to learn to live sustainably! The rich countries like the poor have to promote more*

> *social inclusion, gender equality, and of course energy systems that are low carbon and resilient.*

It is possible to say, thus, that the international community is very committed, in present days, to the current concept of sustainable development, which, according to SACHS (2015) is considered a *"three-way normative framework, embracing economic development, social inclusion, and environmental sustainability"*[5].

The progress and the implementation of the SDGs are closely followed by the UN and some of its organs, like the Department of Economic and Social Affairs (DESA), the Economic and Social Council (ECOSOC), the Statistics Division, the World Health Organization as well as by other International Institutions, partners and stakeholders, such as the World Bank Group (WB), the International Energy Agency (IEA), International Labor Organization (ILO), Organization for Economic Cooperation and Development (OECD), among others.

Therefore, although the reviews on the implementation of the 2030 Agenda for Sustainable Development showed that progress have been made and recognize that *"people overall are living better lives than they were a decade ago"*, they acknowledge that there is still a lot to be done (UN DESA, 2018b; UN ECOSOC, 2017).

Among those 17 SDGs is the objective number 7, which is the object of this research and it aims to ensure access to affordable, reliable, sustainable and modern energy for all.

It is possible to say that the choice of the SDG 7 is intrinsically related to the relevance of universal access to energy in the fight against extreme poverty and to the achievement of sustainable development in terms of renewable energy and energy efficiency.

As will be discussed later, renewable energy play an important role in SDG 7 achievement globally. Likewise, research and technology deployment in the fields of clean energy, infrastructure, sustainable energy services and energy efficiency for developing

[5] SACHS (2015) also highlights that *"sustainable development recommends a holistic framework, in which society aims for economic, social, and environmental goals."*

countries are also relevant tools for ensuring access to affordable, reliable, sustainable and modern energy for all.

The goals established by the 2030 Agenda, however, cannot be achieved individually, since there are significant interlinkages among them.

Nevertheless, it is not possible to assign full responsibility for the achievement of the SDGs uniquely to the national states themselves. On the contrary, there is an international consensus that the responsibility for the achievement of the 2030 Agenda on Sustainable Development is collective and that it does not depend exclusively on governments, but also on the private sectors and civil society, among other stakeholders (SACHS, 2015).

That is why, among the SDGs established, there is the SDG 17, which aims to revitalize the global partnership for sustainable development. Its targets are classified in five different areas, which are (i) finance, (ii) technology, (iii) capacity-building, (iv) trade, and (v) systemic issues, which, on its turn, is subdivided into *(a)* policy and institutional coherence, *(b)* multi-stakeholder partnerships and *(c)* data, monitoring and accountability.

The intent of stablishing a global partnership also relates to the recognition of what WOLF (2001) describes as ‘de-governmentalisation’, which, even though reduces the scope of states’ governance, results in an emergence of new patterns of public-private governance partnerships. Therefore, acknowledging that the boundaries between public and private are much less clear in the international sphere, in general, WOLF (2001) considers that *“pooling public and private resources in synergetic relationships could improve the overall problem solving capacity and at the same time increase societal participation and control”.*

Therefore, it shall be discussed below if the achievement of part of the SDG 17’s targets, mentioned above, are able to help to implement the specific targets of the SDG 7, especially considering the trend of ‘de-governmentalisation’ mentioned by WOLF (2001) and the increasingly relevance of private actions concerning to economic regulation in the international area.

2.1. ENERGY AS A VECTOR OF SUSTAINABLE DEVELOPMENT AT INTERNATIONAL LEVEL

As previously mentioned, the so-called 'hyperglobalization' (RODRIK, 2012) and the near-disappearance of national borders in the context of international trade have produced pressure on national states – especially developing countries – to build infrastructure, explore natural resources and provide low costs of production for transnational companies in order to attract them to establish productive units in their territories.

That measure, in a context of global value chains, theoretically, would allow those countries to create jobs and achieve economic development.

Regarding this, energy is a very relevant issue to be looked upon, since it can be considered an exportable commodity, through transmission lines or different sources of fuel, and, also, an important input for the most diverse means of production – from agribusiness (in irrigation, for example) to complex industrial activities.

Besides being a commodity and an input for industrial activity, energy also provides essential services to satisfy basic human needs, as conserving food, cooking meals, heating and cooling, transport and so on. In SACHS (2015) words, the SDG 7 *"aims to end 'energy poverty', in which households lack access to electricity and safe cooking fuels"*[6].

Lack of electricity does not only affect cooking, but also health, education and businesses, since, for example, clinics cannot store vaccines for children, many schoolchildren cannot do homework at night, and people cannot run competitive businesses without electricity (UN, 2019a).

Moreover, information is a very valuable asset nowadays and considering that network connections and databases depend on electricity, this is a very relevant question for the development achievement.

[6]IEA *et al* (2018; 2019) also recognizes that *"substantial gains can be made in clean energy and energy access that will improve the lives of millions of people".*

While 9 out of 10 people now have access to electricity, some 840 million people around the world are still without access to energy (UN ECOSOC, 2019) and around 3 billion people lack access to clean cooking fuels, resulting in nearly 4 million premature deaths each year, according to UN reports (UN, 2019c; UN ECOSOC, 2019).

IEA *et al* (2019) considered that the uptake of clean cooking solutions is essential to drive down indoor air pollution levels, and efforts to leverage effective technologies need to be elevated on the international political agenda.

Having that in mind, the UN (2019a) considered that reaching the unserved will require increased efforts and that the world needs to triple its investment in sustainable energy infrastructure per year, therefore, regions with greatest energy deficits, such as sub-Saharan Africa and South Asia need help to improve energy access.

Internationally, energy can be seen not just as a commodity or an input for production at lower or higher costs, but also as a result of natural resources exploitation with cross-borders origins or effects, as in the case of the exploitation of a watercourse that goes beyond the borders of a national state or in the generation of pollution that crosses the territorial limits of a country.

In those mentioned situations, it is possible to deduce the close relationship that energy has with sustainable development, since it connects with its three dimensions: economic, social and environmental. Hence, energy shall be considered an important vector of sustainable development.

Indeed, the WCED Report ‘Our Common Future’ has already devoted a special Chapter on energy, where several issues were taken into account, such as the extremely uneven global distribution of primary energy consumption worldwide, the economic, social and environmental aspects of energy consumption, energy efficiency, fossil fuels, nuclear energy, wood fuels and renewable energy, which it considered to be, at that time, in a primitive stage of development. UN (1987) also stated:

> *Renewable energy sources require a much higher priority in national energy programmes. Research, development, and demonstration projects should command funding necessary to ensure their rapid development and demonstration. With a potential of 10TW or so, even if 3-4TW were realized, it would make a crucial difference to future primary supply, especially in developing countries, where the background conditions exist for the success of renewables. The technological*

> *challenges of renewables are minor compared with the challenge of creating the social and institutional frameworks that will ease these sources into energy supply systems.*

UN (1987) professed that every effort should be made to develop the potential for renewable energy, which should form the foundation of the global energy structure during the 21st Century.

Afterwards, the before-mentioned report 'The Future We Want' also dealt with the relationship between energy and sustainable development, registering (UN, 2012):

> *We recognize the critical role that energy plays in the development process, as access to sustainable modern energy services contributes to poverty eradication, saves lives, improves health and helps to provide for basic human needs. We stress that these services are essential to social inclusion and gender equality, and that energy is also a key input to production. We commit to facilitate support for access to these services by 1.4 billion people worldwide who are currently without them. We recognize that access to these services is critical for achieving sustainable development.*
>
> *We emphasize the need to address the challenge of access to sustainable modern energy services for all, in particular for the poor, who are unable to afford these services even when they are available. We emphasize the need to take further action to improve this situation, including by mobilizing adequate financial resources, so as to provide these services in a reliable, affordable, economically viable and socially and environmentally acceptable manner in developing countries.*

The above-quoted report also addressed the need for modern energy services, energy efficiency, climate change and renewable energies, mentioning the launching of the Sustainable Energy for All (SEE for ALL) initiative by the UN Secretary-General.

SEE for ALL consists in a global platform launched in 2011 by the former Secretary-General of the UN Ban Ki-Moon, with three main objectives: (i) to ensure universal access to modern energy services, (ii) to double the global rate of improvement in energy efficiency, and (iii) to double the share of renewable energy in the global energy mix. That initiative intends to support and follow up the national states actions towards the complete implementation of SDG 7, which consists in ensuring access to affordable, reliable, sustainable and modern energy for all, as can be deduced from its report 'Global Tracking Framework – Progress Toward Sustainable Energy 2017' (IBRD; WB, 2017).

It is possible to conclude, therefore, that there is an international concern about energy as an important vector of sustainable development and that is why energy constitutes a specific SDG.

2.2. SUSTAINABLE DEVELOPMENT GOAL 7 – ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

Energy as we know nowadays is usually derived from natural resources' exploitation, either renewable or not. That is the primary reason why energy is a source of environmental concern.

Otherwise, energy is also an indispensable element for industrial processes, transportation, heating and cooking. Therefore, that is also why energy is so relevant for developmental concerns, both in a vision that considers basic human needs to ensure the dignity of the citizens as in a vision where cutting-edge technological development is the main concern.

Thus, SDG 7 has targets that search to meet all the concerns related to energy production and supply, taking into consideration SACHS (2015) *"three-way normative framework"* of sustainable development and embracing economic development, social inclusion, and environmental sustainability, which are:

- By 2030, ensure universal access to affordable, reliable and modern energy services.
- By 2030, increase substantially the share of renewable energy in the global energy mix.
- By 2030, double the global rate of improvement in energy efficiency.
- By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.
- By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programs of support.

The achievement of SDG 7 is also deeply interlinked to almost all the SDGs, as recognized by the Global SDG 7 Conference (UN DESA; UN ESCAP, 2018), such as (i) poverty eradication, (ii) food security, (iii) clean water and sanitation, (iv) health, (v)

education, (vi) prosperity, (vii) job creation, (viii) and the empowerment of youth and women, due to the relevance of the energy consumption and generation/supply for every citizen or economic activity in the whole world.

By monitoring the deployment of the SDG 7 worldwide, it is possible to recognize that the access to electricity has been accelerating in recent years, that the access to clean cooking has increased only modestly since 2010, that the share of renewable energy in the world's total consumption has risen and that the energy efficiency is progressing in industrial sector, even though not as much in domestic use, but that there is still a lot to be done (IEA *et al*, 2018; 2019).

UN DESA (2018b) highlighted that *"in some areas, progress is insufficient to meet the Agenda's goals and targets by 2030"* and that *"This is especially true for the most disadvantaged and marginalized groups".*

Despite the proportion of people with access to electricity in the least developed countries has more than doubled in recent years[7], there is still close to one billion people, mostly in rural areas, about 13% of the world's population, that still lack electricity (UN DESA, 2018b; IEA *et al*, 2019). In this sense, IEA *et al* (2018) affirm:

> *The number of people gaining access to power has been accelerating since 2010 to around 118 million each year, but progress has been uneven, and needs to become more widespread and ramp up further if the SDG7 goal of universal access to electricity is to be met by 2030. Otherwise, if current policies and population trends continue, as many as 674 million people will continue to live without electricity in 2030.*

IEA *et al* (2019) also indicate that almost 87% of the world's population without electricity live in rural areas and that *"off-grid solar solutions ranging from solar home systems to solar mini-grids are emerging as an important driver of rural energy access, complementing grid electrification in some countries".*

The access to clean cooking fuels and technology is also an object of international concern and both before mentioned reports consider that the issue has not received the attention it deserves, since from 2000 to 2016 only 10 percentage points were increased in the percentage of the population with such access, even though the costs

[7] From 2000 to 2016.

involved in ensuring clean cooking solutions are significantly smaller compared to electrification. Thus, there is still 3 billion people, mostly women and children, with their health and well-being adversely impacted by the lack of clean cooking fuels worldwide (UN DESA, 2018b; IEA *et al*, 2018).

IEA *et al* (2018) cite that (i) high entry costs for many clean cooking solutions, (ii) lack of consumer awareness of their benefits, (iii) financing gaps for producers seeking to enter the market, (iii) slow progress in the innovation of clean cookstoves, and (iv) lack of infrastructure for fuel production and distribution have together kept widespread solutions to this challenge out of reach.

UN DESA (2018b) affirms that the share of renewables in final energy consumption worldwide increased modestly, from 17.3% in 2014 to 17.5% in 2015. Only 55% of the renewable share was derived from modern forms of renewable energy, such as bioenergy, geothermal, hydropower, solar and wind. The remaining is derived from traditional uses of biomass, such as fuelwood and charcoal. The increase of renewable energy consumption from 2000 to 2015, in absolute terms, was of 18%, half of which was accountable to electricity, mostly from wind and solar energy, and the other half was mostly bioenergy for heat and transport.

Considering this pace, the share of renewable energy in total energy consumption is projected to reach just 21 per cent by 2030, with modern renewables growing to 15% of total final energy consumption, falling short of the substantial increase demanded by the SDG 7 target, as both reports assumed (UN DESA, 2018b; IEA *et al*, 2018).

While trying to understand the above-mentioned trend, IEA *et al* (2018) affirmed:

> *Rapidly falling costs and enabling policy frameworks have allowed solar and wind to compete with conventional power generation sources in multiple geographies, enabling the share of renewables in electricity to rise relatively rapidly reaching 22.8% in 2015. Nevertheless, electricity accounted for only 20% of total final energy consumption that year, highlighting the need to accelerate progress in use of renewables for transport and heating/cooling, sectors of vital importance to reaching the global target. The share of renewable energy in transport is rising quite rapidly, but from a very low base, amounting to only 2.8% in 2015, while the use of renewable energy for heating purposes has barely increased in recent years and stood at 24.8% in 2015, of which only one third was from modern renewables.*

'Tracking SDG 7 Report' acknowledges that *"among larger energy consumers, developed countries tend to have lower renewable energy shares than developing countries, but their shares are increasing more rapidly"*. It, thus, tries to list the challenges to be faced ahead and the next steps to be taken in order to achieve the SDG 7 targets (IEA *et al*, 2018):

> *Looking ahead, much greater efforts will be required in end-uses, such as heating/cooling and transport, where renewable penetration remains low yet unexploited potential exists. One avenue would be greater adoption of district energy systems (for heating or cooling) based on biomass, geothermal or solar thermal energy. As the electricity sector decarbonizes, other energy uses can increasingly switch into electricity, such as electric vehicles for instance. A phase out of fossil fuel subsidies would help to encourage such shifts. Sustaining the growth of renewable electricity will further require additional attention to grid integration issues, including the incorporation of battery storage and smart grid technology to support management of variable generation resources. Finally, the more rapid global progress on energy efficiency, the larger will be the impact of renewable energy investments on the overall global energy mix.*

In terms of energy efficiency, both reports mention that, globally, the energy intensity[8] decreased by 2.8% in 2015, faster than in any year since 1990 and double the rate of improvement between 1990 and 2010, but to achieve the SDG 7 target, global energy intensity still needs to improve at an annual rate of 2.7% over the period 2016–2030 (UN DESA, 2018b; IEA *et al,* 2018). However, according to IEA *et al* (2018), without intensifying efforts, the pace of improvement is not expected to exceed 2.4% during that period.

UN DESA (2018b) also explains that:

> *High-income countries showed consistent declines, but at a slower pace than low- and middle-income countries. Emerging economies in Asia and the Pacific and in Africa have now surpassed the global rate of improvement in energy intensity, but their intensity levels are higher than the world average. Among end-use sectors, industry made significant progress, reducing intensity by 4.2 per cent in 2015.*

In this sense, IEA *et al* (2018) clarify that there is recent evidence of detachment between growth and energy use, since global gross domestic product (GDP) grew almost twice as fast as primary energy supply in the 2010-2015 period and that economic growth outpaced the energy consumption growth in all regions, except from

[8] The ratio of energy used per unit of gross domestic product – GDP.

Western Asia, and in all income groups. The 'Tracking SDG 7 Report' also indicates that (IEA *et al*, 2018):

> *Improvement in industrial energy intensity, which is the largest energy consuming sector, was particularly encouraging, at 2.7 percent per annum since 2010. However, progress was more modest elsewhere. In high income countries, transportation is the largest energy consuming sector, where there is a need to accelerate efficiency gains, especially for road freight services. In low and middle-income countries, residential energy consumption is high and intensity has been increasing since 2010. Improving efficiency of electricity supply also poses a challenge with thermal power generation presenting unmet potential for efficiency gains, as average fuel conversion efficiency lingered below 39 percent worldwide. In addition, transmission and distribution losses remained high at close to 16 percent in low-income and lower-middle income countries.*

Even though the report recognizes that *"strong improvements in energy intensity are evident both among large emerging economies, like China and Indonesia, as well as among developed economies like Japan and the United Kingdom"*, it considers that energy efficiency policies still need to be systematically adopted in many countries, mentioning also that *"building codes for residential and commercial facilities should include energy performance standards for new construction and major renovation",* as well as cross-sectoral integrated policy approaches that promote stretch improvements through targets or fiscal incentives would be desirable (IEA *et al,* 2018).

Considering the complexity of the energy sector, the large amount of investment needed and the various areas of expertise and means of fostering its targets, better results towards the achievement of SDG 7 necessarily depend on multi-stakeholder partnerships, since partnerships are essential for the efficient and effective efforts toward achieving the SDGs (WAYUNI, 2019) and will play a crucial role for the implementation of 2030 Agenda.

Since there is a broad recognition that there is still a lot to be done in terms of access to clean and affordable energy and in energy efficiency in order to achieve the SDG 7's targets until 2030, it is possible to conclude that it is necessary a broad engagement of various stakeholders to reach the goal to ensure access to affordable, reliable, sustainable and modern energy worldwide. That is the main reason why, recently, the UN demanded a 'sense of urgency' (UN DESA, 2018b) for these last twelve years to reach the goals established by the ambitious – and rather necessary – Agenda 2030.

EC (2019), acknowledging that not a single country has achieved a high human development within planetary boundaries, affirmed that clean energy is the key to a sustainable future and an opportunity for jobs and growth.

Similarly, IRENA (2019b) states that a just and fair energy transition requires a different approach to technical and economic design of energy and power systems. Besides, it considers that renewable energy deployment, along with transition-related investments, opens the possibility to achieve broader development and socio-economic aims (IRENA, 2019b), since renewables have become the least-cost source of new power generation for locations and markets worldwide and the energy transformation would reduce climate and environmental damage, strengthen economies and improve people's welfare (IRENA, 2019a).

2.3. SUSTAINABLE DEVELOPMENT GOAL 17 – STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT

Considering the interlinked nature of SDGs, among them there is the SDG 17, which *"seeks to strengthen global partnerships to support and achieve the ambitious targets of the 2030 Agenda, bringing together national governments, the international community, civil society, the private sector and other actors"* (UN DESA, 2018b). That is why this goal allows to call all stakeholders to contribute with the other SDGs achievements.

Since SDG 17 is a very broad goal, intertwined with all other 16 SDGs, it is composed of 19 specific targets, distributed among seven areas, which are: (i) finance, (ii) technology, (iii) capacity building, (iv) trade, (v) policy and institutional coherence, (vi) multi-stakeholder partnerships and (vii) data, monitoring and accountability.

In finance, the partnership targets intend to (i) strengthen domestic resource mobilization, providing international support to developing countries, (ii) contribute to developed countries' full implementation of their development assistance commitments to least developed countries, (iii) mobilize additional financial resources for developing

countries, (iv) assist developing countries in attaining long-term debt sustainability and (v) adopt and implement investment promotion regimes for least developed countries.

In terms of technology, targets are directed to promote knowledge dissemination and technology transfer from developed to developing countries and contribute to capacity-building, intensifying the use of information and communications technology, among others.

When it comes to capacity building, the specific target is (UN, 2012):

> *enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation.*

SDG 17's specific targets on trade, on its turn, are related to the fomentation of a universal, rules-based, open, non-discriminatory and equitable multilateral trading system, to the increment of exports of developing countries, as well as the implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access.

Considering systemic issues, the SDG targets relate to policy and institutional coherence, to the promotion of multi-stakeholder partnerships, encouraging effective public, public-private and civil society partnerships and to the improvement of developing countries capacity of collecting high-quality and reliable data to support monitoring and the measurement of progress on sustainable development.

While addressing the relevance of the SDG 17 to the achievement of the Agenda 2030 goals, the UN DESA (2018b) asserts:

> *While primary responsibility for achieving the ambitious Goals and targets of the 2030 Agenda rests with individual countries, international support and partnerships are critical, especially for the poorest countries and for countries facing special challenges due to their geographic location. Goal 17 seeks to strengthen global partnerships to achieve the Agenda's goals, bringing together national governments, the international community, civil society, the private sector and other actors.*

Indeed, while following up the implementation of the SDG 17, the UN acknowledged that countries in developing regions need to be better equipped to implement

and monitor their development agendas, considering that the growth of official development assistance (ODA) and the foreign direct investment have stagnated over the last few years (UN DESA, 2018b). Thereby, UN DESA (2018b) adds:

> *Development partners need to do more to align their support with governments' national development strategies and results frameworks, particularly in fragile countries, respecting the country's policy space and leadership in establishing its own path towards sustainable development.*

It is possible, then, to say that the compliance with the targets originated on SDG 17 is essential for the achievement of the SDG 7 – 'Ensure access to affordable, reliable, sustainable and modern energy for all', especially with regard to the engagement of various agents in terms of finance, technology, capacity building, trade, policy and institutional coherence and multi-stakeholder partnerships.

With the aim to monitor the progress of partnerships directed to achieve the SDGs, UN has created the SDG Partnerships Platform where, until September 2019, there were 598 registered initiatives concerning specifically targets of the SDG 7 worldwide[9].

In 2018, 51 out of 114 countries reported overall progress to the UN concerning multi-stakeholder partnerships and the means of implementation the 2030 Agenda (UN, 2019e). Nevertheless, it is acknowledged that there is a need to increase space for civil society's contribution to sustainable development and for a more inclusive and relevant dialogue between the public and private sectors (UN, 2019e).

Therefore, considering the origin and the objectives pursued by SDGs, as well as the relevance of energy as a vector of sustainable development, it is possible to conclude that the achievement of the SDG 7 targets also depends on multi-stakeholder partnerships, be they public, private or mixed.

Notwithstanding, international standardization process is a field in which is possible to achieve a productive dialogue between public and private sectors, considering that a good standardization process may allow the participation of all stakeholders interested in the final result, such as industry, consumers, academia, governments and regulators.

[9] . https://sustainabledevelopment.un.org/partnerships/goal7/. Accessed on 12 Sep 2019

3. FRAGMENTATION OF INTERNATIONAL LAW AND INTERNATIONAL STANDARDIZATION

It is not possible to analyze international standardization without mentioning the recent process of fragmentation of international law, as well as the pursuit for regulatory convergence and the legitimacy of international standards. Thus, in this Chapter these issues are discussed and the concepts used throughout this research are presented.

3.1. FRAGMENTATION OF INTERNATIONAL LAW AND THE PURSUIT FOR INTERNATIONAL REGULATORY COHERENCE

The debate about the unity of international law is not recent. Due to the past decades' globalization and the increasingly technical specialization of international rules, fragmentation of international law has been an important issue addressed by scholars (AMARAL JÚNIOR, 2008; RAPOSO, 2013).

Recently, the growth of different sorts of relationships between states, enterprises and people internationally, as a result of constant internationalization has caused a wide diversification and expansion of international law.

Therefore, the UN International Law Commission (UN ILC) decided to include *"risks ensuing from the fragmentation of international law"* in its long-term work plan, considering it could contribute for a topic of relevant discussion for international law (RAPOSO, 2013).

During its 54th Session, which took place in 2002, the Commission decided to create a Study Group about the topic: *"The fragmentation of international law: difficulties arising from the diversification and expansion of international law"* (UN ILC, 2006).

The Study Group developed its activities from 2002 to 2006, when finalized its analytical study and submitted its report and conclusions to the UN ILC, which accepted them at its 2911th meeting (UN ILC, 2006).

It was acknowledged by the Study Group report that the scope of international law has increased dramatically in the past half century and that it has expanded, from a tool before dedicated to deal with formal diplomacy rules, to deal with the most varied kinds of international activity, naming, for example, trade, environmental protection, human rights, scientific and technological cooperation, and broad fields of action such as commerce, culture, security and development (UN ILC, 2006; AMARAL JÚNIOR, 2008).

Likewise, the report states that *"it is difficult to imagine today a sphere of social activity that would not be subject to some type of international legal regulation"*, although it recognizes that this above-mentioned expansion of international law has taken place in a very uncoordinated way, mostly within regional scope or in small groups of States, rather than in a context of broad regulation (UN ILC, 2006). And it continues:

> *It is a well-known paradox of globalization that while it has led to increasing uniformization of social life around the world, it has also led to its increasing fragmentation – that is, to the emergence of specialized and relatively autonomous spheres of social action and structure.*

Aware of the difficulties in applying the international law in this context of high specialization and fragmentation and recognizing the possible conflicts arising from it, the Study Group intended to provide a toolbox to guide legal professionals on the interpretation of the contemporary international law.

Thus, the conclusions reached by the study group were made public through 42 statements among which it is possible to find the main assertion that the international law is a legal system, which must always guide the application of the international rules, as well as the principle of harmonization, by which international actors do not assume obligations that are contradictory (RAPOSO, 2013).

Also, according to RAPOSO (2013), it must always be assumed that there is a harmony underlying the legal system and, therefore, solutions that favor the construction of a coherent normative system must be sought.

The principle of harmonization is very connected to the presumption against the conflict, designed around half a century ago by Wilfred Jenks, as mentioned by AMARAL JÚNIOR (2008), which lies in the assumption that the new norm is compatible with the international law in force before its creation.

As previously mentioned, the expansion of the international law has created a conducive environment for the proliferation of different, usually specialized, international regulation, which contributed to the deepening of the tendency of international law fragmentation in multiple specific subsystems, giving rise to the concern about the coherence of international law (AMARAL JÚNIOR, 2008).

Indeed, MARCEAU (1999), analyzing the coherence in international trade, affirmed that *"basic rules and principles of treaty interpretation, such as the presumption against conflicts and the necessity for effective interpretation, are expressions of this need for a coherent approach to international law matters generally"*.

This is a very important concern, considering that, with the expansion of international law and the coexistence of various specialized subsystems of international regulation, different – and sometimes contradictory – regulations may strongly affect international trade in general.

In this regard, MARCEAU (1999) mentioned that, sometimes, environmental standards are established in national regulation as a form of disguised protectionism, reducing market access and imposing high costs. Even though the before-mentioned concern is considered valid by the author, MARCEAU (1999) stated that *"the spectre of protectionism should not undermine efforts to negotiate provisions to increase the coherence of trade, development and environmental laws and policies*".

International regulatory coherence and convergence were also subject of a massive research project developed by the Centro de Estudos do Comércio Global e Investimento da Escola de Economia de São Paulo – FGV/EESP, with the support of United Kingdom Embassy in Brazil. The final report of this project mentions that national regulation might constitute significantly non-tariff barriers to international trade (THORSTENSEN; BADIN, 2017).

The report also stated that the international commerce suffers with the multiplication, fragmentation and overlap of regulation for different types of activities, that does not always follow the international standards already established, what generates national regulatory policies completely different. The spread of substantial differences results in inefficiencies for international rules and procedures, imposing additional costs to

citizens, producers, exporters and importers and, ultimately, end up discriminating against and restricting international trade, whether premeditatedly or not (THORSTENSEN; BADIN, 2017).

THORSTENSEN and BADIN (2017) also registered that the most recent system of international commerce focuses on dismantle those types of barriers, not applied at the border, but internally, such as national rules on services, investments, competition, technical rules, sanitary and phytosanitary measures, environmental issues and conformity and accreditation procedures.

In addition, the above-mentioned study raised the debate about the concrete distinctions between the regulatory coherence and regulatory convergence, comparing the OECD's definition to others, such as the Trans-Pacific Partnership's concept (THORSTENSEN; BADIN, 2017).

For the purposes of this study, the OECD's concept is adopted, which states that regulatory coherence is related to supranational, national and subnational levels of government, while regulatory convergence is established only at the international level, among States, and it could be also applied for international private regulation, another sphere of international regulation that contributes for increasing complexity of international law and relations in present days (THORSTENSEN; BADIN, 2017).

As well as international law coherence in general, regulatory convergence – in the sense of achieving some degree of coherence among international regulations in each specific sector (e.g.: environmental protection, renewable energies, services, etc.) – is an important goal that must be persecuted in order to favor international relations, international trade, economic and social development overall.

Presumably, this is the reason why TPP has dedicated an entire Chapter to regulatory coherence, establishing that those rules would be applied to regulatory measures, considered measures of general application related to any matter covered by the Agreement adopted by regulatory agencies with which compliance is mandatory[10].

[10] As it is possible to read on Article 25.1 of TPP's final text.

Additionally, in article 25.2, it refers to good regulatory practices:

> *1. For the purposes of this Chapter, regulatory coherence refers to the use of good regulatory practices in the process of planning, designing, issuing, implementing and reviewing regulatory measures in order to facilitate achievement of domestic policy objectives, and in efforts across governments to enhance regulatory cooperation in order to further those objectives and promote international trade and investment, economic growth and employment.*
>
> (highlighted)

This Chapter content is considered, in WEISS (2016) words, a groundbreaking first step in codifying as a global norm that countries shall establish central coordination and review mechanisms for regulation and follow good regulatory practices to help achieve domestic policy objectives and promote regulatory cooperation.

Even though the above-mentioned Chapter was *"fully consistent with the U.S. regulatory system"* (WEISS, 2016), since the United States' withdrawal of the TPP, there is no international consensus about the Agreement's future. It is not possible, though, to disregard the international relevance of the fact that signatories States achieved consensus on the content and writing of this Chapter, denoting that the pursuit of good regulatory practices is a relevant concern in terms of international trade.

3.2. INTERNATIONAL STANDARDIZATION

The trends of international standardization[11] and private regulation are not new. As the report WTE/CTE/W/10 G/TBT/W/11 of the Committees on Trade and Environment and on Technical Barriers to Trade of the World Trade Organization registers *"the unreasonable application of standards, packaging, labelling and marking requirements"* was an object of concern for the Working Group 3, established by the Committee on Trade in Industrial Products in December 1969. At that time, the Working

[11] ISO and IEC (2004) define standardization as the "*activity (process of formulating, issuing and implementing) of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context".*

Group 3 already discussed unnecessary requirements and high costs as obstacles to the development of international trade (WTO, 1995a).

Therefore, in 1973, the Working Group 3 proposed the 'Draft Standards Code', which was widely discussed in terms of standardization, labelling requirements and burden to international trade. Besides, discussions also approached issues like simplification, harmonization and need of technical assistance for developing countries (WTO, 1995a).

Notwithstanding, the definitions of technical regulations and standards have also been object of wide discussion (WTO, 1995a):

> *Since 1969 delegations had emphasized that in order to regulate the application of standards, it was important to draw a clear distinction between mandatory regulations and voluntary standards. While mandatory regulations were issued by the governments, voluntary standards were usually issued by private organizations on a regional, national or international basis.*

WTO (1995a) registers that in 1974, the Government Officials Responsible for Standardization within the UN Economic Commission for Europe (ECE), in pursuit of harmonization of international standards, defined standard as:

> *"a technical specification or other document available to the public, drawn up with the co-operation and consensus or general approval of all interests affected by it based on the consolidated results of science, technology and experience, aimed at the promotion of optimum community benefits and approved by a body recognized on the national, regional or international level."*

ECE noted, otherwise, that technical specification that did not satisfy all the conditions above could be called by other names, such as 'recommendation' and that, in some languages, the word 'standard' was often used with another meaning and it could refer to a technical specification, that did not satisfy all the given conditions, citing 'company standard' as an example (WTO, 1995a).

By request of the Technical Barriers to Trade Sub-Group, in 1975, the Secretariat prepared a background note on standards. This document contained a 'Proposed GATT Code for Preventing Technical Barriers to Trade', which defined standard as (WTO, 1995a):

> *any specification which lays down some or all of the properties of a product in terms of quality, purity, nutritional value, performance, dimensions, or other characteristics. It includes, where applicable, test methods, and specifications*

> *concerning testing, packaging, marking or labelling to the extent that they affect products rather than processes. It excludes standards that are prepared for use by a single enterprise, whether governmental, semi-governmental or non-governmental, either for its own production or purchasing purposes.*

It also differentiated ‘mandatory standard’ from ‘voluntary standard’, defining the latter as *“a standard with which there is no legal obligation to comply”*. Likewise, it proposed classifying standards bodies as following (WTO, 1995a):

> *voluntary standards body: "any non-governmental organization which prepares voluntary standards for public use. Some of these are national standards bodies as defined below";*
>
> *national standards body: "a nationally recognized standards body which is, or is eligible to become, a member of non-governmental international standards bodies";*
>
> *regional standards body: "any international organization, whether governmental or non-governmental, which prepares standards, and which does not admit the relevant bodies in all adherents to participate in the preparation of such standards" and;*
>
> *international standards body: "any international organization of recognized standing, whether governmental or non-governmental, which prepares standards, and which admits the relevant bodies in all adherents to participate in the preparation of such standards".*

Later, during the discussions that led to the final text of the Agreement on Technical Barriers to Trade – TBT, the definitions above discussed were limited.

In this sense, while recognizing that (i) international standards and conformity assessment (CA) systems can improve efficiency of production and facilitate international trade; (ii) international standardization can contribute to the transfer of technology from developed to developing countries; and (iii) developing countries may encounter special difficulties in the formulation and application of technical regulations and standards and procedures for assessment of conformity with technical regulations and standards; and desiring (i) to encourage the development of international standards and CA systems; and (ii) to ensure that technical regulations and standards do not create unnecessary obstacles to international trade, the TBT Agreement establishes (WTO, 1995b):

> *2.2 Members shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade. For this purpose, technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective, taking account of the risks non-fulfilment would create. Such legitimate objectives are, ‘inter alia’: national security requirements; the prevention of deceptive practices; protection of human health or safety, animal or plant life or health, or the environment. In assessing such*

> *risks, relevant elements of consideration are, 'inter alia': available scientific and technical information, related processing technology or intended end-uses of products.*
>
> *(...)*
>
> *2.4 Where technical regulations are required and relevant international standards exist or their completion is imminent, Members shall use them, or the relevant parts of them, as a basis for their technical regulations except when such international standards or relevant parts would be an ineffective or inappropriate means for the fulfilment of the legitimate objectives pursued, for instance because of fundamental climatic or geographical factors or fundamental technological problems.*
>
> *2.5 A Member preparing, adopting or applying a technical regulation which may have a significant effect on trade of other Members shall, upon the request of another Member, explain the justification for that technical regulation in terms of the provisions of paragraphs 2 to 4. Whenever a technical regulation is prepared, adopted or applied for one of the legitimate objectives explicitly mentioned in paragraph 2, and is in accordance with relevant international standards, it shall be rebuttably presumed not to create an unnecessary obstacle to international trade.*
>
> *2.6 With a view to harmonizing technical regulations on as wide a basis as possible, Members shall play a full part, within the limits of their resources, in the preparation by appropriate international standardizing bodies of international standards for products for which they either have adopted, or expect to adopt, technical regulations.*

Clearly, technical regulations, according to TBT, would not be considered technical barriers to trade if they do not create unnecessary obstacles to international trade. And they could even be beneficiary of a presumption of conformity with TBT Agreement if they are based on international standards, as stated by its article 2.5, second part, above mentioned.

The preparation, adoption and application of standards will be considered below. At this moment, we shall focus on the definitions presented by TBT, since the definition of the object of the present study depends on this analysis.

Therefore, the Annex 1 list the following terms and definitions for the purpose of TBT:

> *1. Technical regulation:*
>
> *Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.*

2. Standard:

Document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.

In relation to standard's definition, the Annex 1 also brings the following explanatory note:

The terms as defined in ISO/IEC Guide 2 cover products, processes and services. This Agreement deals only with technical regulations, standards and conformity assessment procedures related to products or processes and production methods. Standards as defined by ISO/IEC Guide 2 may be mandatory or voluntary. For the purpose of this Agreement standards are defined as voluntary and technical regulations as mandatory documents. Standards prepared by the international standardization community are based on consensus. This Agreement covers also documents that are not based on consensus.

(highlighted)

While defining *"body"* mentioned in the definition of standard: the Annex 1 distinguishes:

4. International body or system

Body or system whose membership is open to the relevant bodies of at least all Members.

5. Regional body or system

Body or system whose membership is open to the relevant bodies of only some of the Members.

6. Central government body

Central government, its ministries and departments or any body subject to the control of the central government in respect of the activity in question.

Explanatory note:

In the case of the European Communities the provisions governing central government bodies apply. However, regional bodies or conformity assessment systems may be established within the European Communities, and in such cases would be subject to the provisions of this Agreement on regional bodies or conformity assessment systems.

7. Local government body

> *Government other than a central government (e.g. states, provinces, Länder, cantons, municipalities, etc.), its ministries or departments or any body subject to the control of such a government in respect of the activity in question.*
>
> *8. Non-governmental body*
>
> *Body other than a central government body or a local government body, including a nongovernmental body which has legal power to enforce a technical regulation.*

The relevance of international standards definition with regard to the TBT Agreement was also highlighted in the decision of the WTO's Dispute Settlement Appellate Body in US-Tuna II, where it figured (WTO, 2012):

> *This question is important because, by virtue of Article 2.4, if a standard is found to constitute a 'relevant international standard', WTO Members are required to use it, or its relevant parts, as a basis for their technical regulations, except when much standard would be an ineffective or inappropriate means for the fulfilment of the legitimate objectives pursued by the Member in question. Moreover, pursuant to Article 2.5 of the TBT Agreement, technical regulations that are in accordance with relevant international standards are rebuttably presumed not to create unnecessary obstacles to international trade.*

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) does not present a clear definition of international standards[12], although it refers to the need of harmonization of sanitary and phytosanitary measures with international standards, guidelines or recommendations in its article 3. Additionally, in its Annex A – 'Definitions', it actually exemplifies international standards, guidelines and recommendations for the purpose of the SPS Agreement as (WTO, 1995c):

> *3. International standards, guidelines and recommendations*
>
> *(a) for food safety, the standards, guidelines and recommendations established by the Codex Alimentarius Commission relating to food additives, veterinary drug and pesticide residues, contaminants, methods of analysis and sampling, and codes and guidelines of hygienic practice;*
>
> *(b) for animal health and zoonoses, the standards, guidelines and recommendations developed under the auspices of the International Office of Epizootics;*
>
> *(c) for plant health, the international standards, guidelines and recommendations developed under the auspices of the Secretariat of the International Plant Protection Convention in cooperation with regional organizations operating within the framework of the International Plant Protection Convention; and*

[12] As mentioned by LIMA (2016), members could not reach a consensus on the definition of private standards related to the SPS Agreement.

> *(d) for matters not covered by the above organizations, appropriate standards, guidelines and recommendations promulgated by other relevant international organizations open for membership to all Members, as identified by the Committee.*

There is a vast discussion about the differences between standards set by public or private entities, the latter being prepared not by regulatory authorities, but by non-governmental entities, usually having as central object whether its observance is voluntary or mandatory (THORSTENSEN; VIEIRA, 2016).

This criterion is highly questionable, as mentioned by THORSTENSEN and VIEIRA (2016), since public authorities may produce both mandatory and voluntary standards, as well as non-conformity with private standards may, sometimes, prevent imports, distribution or sales of product, in practice[13].

The proliferation of standards, as well as codes of conduct, management protocols and guidelines produced by market actors and nongovernmental entities and its influence over public regulation is also an object of concern in Socially Responsible Investment (SRI), as mentioned by RICHARDSON (2008).

Considering the discussion about all those before-mentioned concepts, it is important to delimitate, here, the definitions that will be used for the development of the present research, without ignoring the other definitions brought by the authors read, which will be duly indicated in footnotes.

Table 01 – Concepts used in this research

Term	Definition	Reference
Standard	*"Document approved by a recognized body, that provides,*	Annex 1 – TBT Agreement[14]

[13] IRENA (2013) also mentions the characteristic of "mandatory in practice" of some voluntary standards.

[14] ISEAL (2014) adopts very similar concept too. IISD and UNEP (2014) also consider that standards are voluntary. MELIADO (2017), THORSTENSEN and VIEIRA (2015a) and LIMA (2016) also refer to ISO/IEC (2004) definition of standards, which, in the ISO/IEC Guide 2 is *"document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their result, aimed at the achievement of the optimum degree of order in a given context."*. ISO/IEC (2004) also state that *"standards should be based on the consolidated result of science, technology and experience, and aimed at the promotion of optimum community benefits"* and distinguish mandatory standards from voluntary ones, which allows us to conclude that not every standard, in ISO/IEC's conception, is voluntary, differently from what is considered by the TBT Agreement.

	for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method."	
Private Standards	*"standards designed and owned by non-governmental entities, be they for profit (businesses) or not-for-profit organizations."*	Pascal Liu[15]
International Standard	*"standard that is adopted by an international standardizing /*	ISO/IEC Guide 2[16]

[15] (LIU, 2018). LIU considers that, on the contrary of governmental standards, which can be either mandatory or voluntary, private standards are *"voluntary by definition".* ITC (2012-iv) also considers that *"private standards are understood as norms developed by private entities such as companies, non-governmental organizations or multi-stakeholder coalitions".* Likewise, MELIADO (2017) affirms that private standards are set and operated by private companies, civil society organizations, or joint initiatives thereof. The author also states that *"compliance with requirements is voluntary, but it can become de facto mandatory when the standard setter, e.g. a large distributor, has a particularly dominant position in a given product or geographic market."* THORSTENSEN and VIEIRA (2015a) assert that *private standards differ from public ones since they are not prepared by regulatory authorities, but instead by nongovernmental entities."* When discussing the voluntary nature of those standards, the authors argue that *"Many publications on private standards have often confused the terms and have employed 'private standards' as synonyms for 'voluntary standards'. Voluntary standards are those that are not mandatory. Often, public authorities produce mandatory standards, but there are some voluntary standards that have been produced by public authorities too."* In the same sense, LIMA (2016). Additionally, ISO (2010) states that *"Although so-called "private" standards may be viewed to encompass any standard developed by an entity outside of government, the characterization may be misleading".*

[16] DUPUY and VIÑUALES (2015) mention that TBT Agreement does not explicitly define the term "international standard" but both TBT and SPS Agreements provide some guidance on the identification of appropriate standards. On the other hand, UNIDO refers to international standards as those ones which *"are developed and disseminated by international governmental and non-governmental standards development organizations, such as International Standardization Organization, International Electrotechnical Commission, the International Telecommunication Union or Codex Alimentarius. These international standards are voluntary standards."* (https://www.unido.org/our-focus/advancing-economic-competitiveness/meeting-standards/private-standards, accessed on 04 Jul 2019). MELIADO (2017) also considers that *"the attribute "international" refers to who develops a standard, as well as to how such standard is developed (i.e. by consensus)."* In the same sense, LIMA (2016). Moreover, ISO (2010) affirms that *"In these principles for "international standards", no distinction is made between standards developed by international governmental organizations, international non-governmental organizations or other "private" organizations."*, even though, in the same document, alleges that "The formal international standardization system is a platform that can potentially complement, or help harmonize various private standards, and help

	standards organization and made available to the public."	
Technical Regulation	*"Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method."*	Annex 1 – TBT Agreement[17]
Voluntary Sustainability Standards (VSS)	*"Private voluntary sustainability standard systems*	KOMIVES and JACKSON[18]

provide coherent global solutions.", mentioning ISO standards as formal international standards and not as private ones.

[17] ISO/IEC (2004) define technical regulation as *"regulation that provides technical requirements, either directly or by referring to or incorporating the content of a standard, technical specification or code of practice."* ISO/IEC Guide 2 (2004) also defines regulation as *"document providing binding legislative rules, that is adopted by an authority."* MELIADO (2017), on its turn, affirms that regulations are *"set, adopted, and applied by the government directly or indirectly. May be based on standards, particularly "international", but also "private" standards. Compliance with relevant requirements is mandatory."* UNIDO mentions that government standards are often called technical regulations and that they differ from the rest because they are by law mandatory (https://www.unido.org/our-focus/advancing-economic-competitiveness/meeting-standards/private-standards, accessed on 04 Jul 2019). ISO (2010) also states that *"Technical regulations set out legally binding technical requirements often with the aims of protecting public health and safety, and the environment. They may set out the requirements in generic term (e.g. essential requirements), or in explicit terms, and the may incorporate, by reference or verbatim, the contents of a voluntary standard for all, or some, of the details thereby making compliance to the voluntary standard a part of, or a presumption of, compliance with a regulation."*

[18] (KOMIVES; JACKSON, 2014). IISD and UNEP (2014) emphasize that VSS *"are non-binding in nature, and may be implemented by governments, the private sector or NGOs"*. UNFSS (2018) registers that "*there is no universally agreed definition of a voluntary standard"* and, based upon ISEAL characterization, defines four major attributes of VSS: *"(1) they have a discernible standard-setting and implementation system (i.e. they are not just a piece of paper but standard systems in the sense of the above definition); (2) they are led by private actors (NGOs and/or firms); (3) they are not corporate codes of conduct (i.e. firm-level programs); (4) they use information (typically certification/labelling) to create market incentives for sustainable production."* UNFSS also defines VSS as *"a new regulatory form, situated at the intersection of marketbased instruments, regulation by information, and voluntary private governance"* and affirms that *"most VSS systems are non-governmental and therefore fall in the category of private standards. Among this group, it is possible to distinguish between single-actor and multi-actor systems and between different sponsorship arrangements (private sector, civil society or collaborative sponsorship)".* RICHARDSON (2008) affirm that voluntary standards *"are not mandatorily imposed upon companies"* and *"lack administrative and criminal apparatus available to state regulators"* and that voluntary regimes *"rely upon informal sanctioning measures, such as*

	are an innovative market-based approach to promoting sustainable production and business practices. Adoption of these sustainability standards is intended to be voluntary: the standards are not created, run, or required by governments or government regulation. Instead, voluntary sustainability standard systems are non-government initiatives that seek to drive sustainable production and consumption by creating market demand for sustainable products, and a supply to meet that demand."	
International Standards Organization	*"Standards organization whose membership is open to the relevant national body from every country."*	ISO/IEC Guide 2 + WTO DS Appellate Body[19]

It is possible, thus, to see that the distinctive features from the before mentioned concepts are, basically: (i) if they are voluntary or mandatory, (ii) their origin or which organizations have issued them, and (iii) their comprehensiveness (if local, national, regional or international).

Therefore, it is feasible to conclude that standards can be either voluntary or mandatory, issued by governments, non-governmental entities, standards bodies or

dialogue and community pressure, or ostracism of delinquent firms from the regime by the sponsoring industry association".

[19] Annex 1 of TBT defines *"international body or system"* as the *"body or system whose membership is open to the relevant bodies of at least all Members"* (detached here). WTO's Dispute Settlement Appellate Body decided, in WT/DS381/AB/R (US-Tuna II), p. 356 and p. 395, that, *"for the purposes of the TBT Agreement, international standards need to be adopted by 'international standardizing bodies', which may, but need not necessarily, be 'international standardizing organizations'."* ISEAL (2014) brings the concept of Standards-Setting Organization as the organization *"responsible for managing the development or revision of a standard".*

organizations and other agents, they can also produce effects locally, nationally, regionally or internationally.

Likewise, standards can have diverse contents, such as technical specifications, product's characteristics, processes or production methods (PPMs), and distinct objectives, as environmental protection, health and safety, for example.

That is why standards' nomenclature and classification will vary according to these various components. That is also the reason why some standards fit in more than just one of the before mentioned definitions.

Notwithstanding the vast theoretical discussion about those concepts, specifically for the purpose of the present research, the definitions described in the table above, carefully selected, will be used.

The standards that fit in the object of the present research, and, therefore, will be studied, are precisely the standards developed by non-governmental bodies (origin), voluntary (even though, in practice, they are sometimes "almost mandatory"), with international scope, focused on renewable energies (content) and which purpose is, at least in principle, sustainability (objective).

It is also important to register that the standards which are an object of the present research do not consist of the 'non-state market driven' (NSMD) governance systems described by BERNSTEIN and CASHORE (2007), since they are not necessarily mandatory, as mentioned before, and, therefore, not subject of a common compliance mechanism. They are effectively closer to 'market standards', as adopted by THORSTENSEN and VIEIRA (2015a).

In this sense, as recognized by DUPUY and VIÑUALES (2015), environmental protection can hardly be achieved without initiative and cooperation of the private sector, which can contribute particularly in project financing, technology transfer and environmental governance. The authors also considered that, even in cases where the content of a soft law instrument does not become legally binding, it may still be influential.

Although ISO/IEC do not consider the standards they produce as 'private standards', but as 'international standards', in this research they will be considered as

private, considering that they are issued by non-governmental entities. It is important to emphasize, though, that the fact they are considered private does not remove the international effects of such standards. Therefore, they are considered, here, international in terms of comprehensiveness and private in terms of origin.

After surpassing the necessary conceptualization for the development of the research, regarding standards issuance, its legitimacy will be examined in the future topics.

3.3. LEGITIMACY OF INTERNATIONAL STANDARDS

The massive proliferation of private standards, which is supposedly due to government failure (WOLF, 2001), and its relevant effects are objects of concern in the context of international trade. Nevertheless, there is a vast ongoing discussion about private standards legitimacy and accountability.

Indeed, HACHEZ and WOUTERS (2011) affirmed that *"legitimacy has become a central theme in discussions about regulation in the context of global governance".* Similarly, THORSTENSEN and VIEIRA (2016) alleged that *"one of the big challenges faced by the proliferation of market standards has been legitimacy on creation and setting of such standards as well as accountability and State responsibility towards the behavior of the bodies that have issued them".*

THORSTENSEN and VIEIRA (2015a) also explained that concerns about legitimacy, accountability and trade barriers are directly related to some of the challenges that international trade governance has faced with private standards, such as:

> *i) multiplicity of interoperability of private standards, which implies lack of harmonization and equivalence on similar standards, including compliance costs, since there are multiple standards for a single product;*
>
> *ii) marginalization of small holders and developing and least developed countries due to complex, rigorous and multi-dimension standards;*
>
> *iii) concerns that private standards undermine the structure of the WTO Agreements on Technical Barriers to Trade (TBT) and Sanitary and Phytossanitary Measures (SPS);*

> *iv) risk that private standards are disguised and arbitrary measures that undermine all the globalized structure of free trade;*
>
> *v) multiplication of private standards that may put at risk their sustainability objectives and create confusion to producers and consumers ('green-washing');*
>
> *vi) lack of a multi-dimensional approach on addressing risks for the composition of private standards since many of the standards set are not science-based;*
>
> *vii) effects of many private standards that are part of global supply chains, which generates concerns on national policies and priorities and respect to natural trade intensity of exporting countries.*

Specifically, with regard to legitimacy, THORSTENSEN and VIEIRA (2015a; 2016) summarized that *"concerns related to legitimacy intend to answer questions such as: i)' who produces the standards?' and ii) 'where such authority comes from?'".*

ITC (2012a) registered that the legitimacy of private standards is an object of controversial debate in literature, even though it recognizes that there is a number of co-existent approaches aiming to define what makes a legitimate standard and, moreover, that governments and intergovernmental bodies express concerns about the legitimacy of private standards in general.

HACHEZ and WOUTERS (2011), in their turn, identified two dimensions of the legitimacy of a norm, which are (i) the normative and (ii) the empirical/descriptive. In their words:

> *Whereas the normative dimension of legitimacy relates to the validity of such norm in regard of the normative expectations of its addressees, its empirical/descriptive dimension designates the level of acceptance of such norm as being the right thing to do.*

Likewise, the quoted authors considered that *"achieving legitimacy is a major objective for a norm such as a global standard, as this conditions its ability to reach its governing goal"* (HACHEZ; WOUTERS, 2011).

MARX (2010) distinguished 'input' legitimacy from 'output' legitimacy, claiming that the former refers to the degree of inclusiveness and transparency of the internal decision-making process with regard to setting standards and the latter refers to the effectiveness of the standard-setting initiatives and focuses on the enforcement mechanisms.

WOLF (2001) also expressed his concern with regard to the legitimacy of private regulation from the perspective of 'output' and 'input' legitimacy. In his line of thought, 'output' legitimacy must be measured considering (i) the achievement of issue-specific goals and (ii) the capability of achieving overall goals. Otherwise, 'input' legitimacy would be more related to the authority of the regulatory body. In this case, the author discussed the possibility of authorization by State as the source of legitimacy, but he considered that formal authorization by governments is not a strong source of input legitimacy in the international sphere as in the domestic context.

Therefore, even though WOLF (2001) acknowledged that compliance with private regulation may derive from the sense of obligation created by different instruments – from persuasion to coercion – such as moral pressure, public opinion or market forces, he claims that characteristics here named as credibility, recognition and expertise could grant authority to private actors in terms of 'input' legitimacy:

> *Starting out from the question why private actors can claim to be and are actually accepted as "an authority", reasons such as moral authority acquired through a credible commitment to basic norms or to the general welfare, the recognition of knowledge, or expertise and representational skills come to one's mind. I would regard these factors as the real and genuine pillars of the input legitimacy of private actors' contributions to governance beyond the state.*

However, although WOLF (2001) admitted that the legitimacy problem is not limited to private actors, he affirms that the understanding of 'input' legitimacy as the result from the power of the moral and knowledge-based authority of private actors is not congruent with the liberal notion of democratic legitimacy.

HENSON and HUMPHREY (2009), while discussing private standards in the production and trade of food, acknowledged that the increasing importance of these standards raises the issue of their legitimacy. Therefore, even though the authors admitted that they approach legitimacy to fairness, they considered that private standards' legitimacy could be assessed by the following indicators:

> - *Extent to which the standards-setting process is transparent.*
>
> - *Extent to which agri-food value chain stakeholders can have a substantive influence on the standards-setting process.*
>
> - *Extent to which developing country interests are taken into account in the standards-setting process.*

> *- Speed of the standards-setting process and responsiveness to the demand for new or revised standards.*
>
> *- Degree to which the standards-setting process itself can evolve as needs change.*
>
> *- Degree to which standards promote processes of harmonisation and/or benchmarking of food safety requirements.*
>
> *- Degree to which these standards are risk-based and/or permit particular levels of food safety protection to be achieved more efficiently.*

The relevance of the debate on the legitimacy of private standards lies in the fact that, although they are considered voluntary, those standards may be (i) made legally mandatory if adopted by governments or referred on legally binding norms (HENSON; HUMPHREY, 2009; ITC, 2012a) or (ii) adopted widely enough to change conditions of market access, becoming *de facto* mandatory[20].

In this context, ITC (2012a) affirmed that *"private standards are governance mechanisms beyond the state that claim legitimacy, although these may not be elected mandate holders and do not have democratic internal structures."* And specifically highlighted that *"without a certain extent of legitimacy, standards are not accepted as regulatory instruments".*

ITC (2012a) summed up the discussion emphasizing that the different notions of legitimacy found in the literature revolve around the three concepts of transparency, inclusiveness and accountability. It added that these concepts can be evaluated in the different stages of (i) standards setting, (ii) standard implementation and the certification process, (iii) standard monitoring, and (iv) the impacts of standards. It also mentions:

> *The key elements according to which these stages are scrutinized include: the assurance of a transparent process, the inclusion of diverse interests (inclusiveness), the scientific foundation of requirements, and the accountability of standard organizations. The concepts of legitimacy tend to focus on one or two stages that are analyzed according to one or several elements of legitimacy. It is important to note that concepts such as accountability, transparency and inclusiveness are overlapping as for one of them to function it requires that the other two be equally respected. For example, to achieve full accountability organizations need to be transparent; and inclusiveness is not very useful if you are not at the same time accountable to the stakeholders you are including.*

[20] In this sense: HENSON and HUMPHREY (2009); ITC (2012a), THORSTENSEN and VIEIRA (2015a; 2016) and LIMA (2016).

The debate about legitimacy of private standards is almost always followed by the debate about accountability. However, it is important to highlight that the debate about accountability could be related both to (i) the responsibility for private standards impacts on international trade, especially related to States' liability in WTO System[21] or (ii) accountability to the stakeholders included – or not – in the standards development process, as mentioned by ITC (2012a). Only the latter is the object of interest of this research, since it is directly connected to legitimacy of private standards, particularly regarding to the standards' issuing procedures and its effectiveness.

Notwithstanding, transparency and inclusiveness or 'openness' are characteristics of standard setting procedures which are appointed practically unanimously in every discussion about legitimacy of private standards.

Indeed, in the 2000 Decision of the TBT Committee on Principles for the Development of International Standards, Guides and Recommendations, declares that the issuance of international standards needs to observe principles and procedures mentioned under Articles 2, 5 and Annex 3 of the TBT Agreement, especially transparency, openness, impartiality and consensus, effectiveness and relevance, coherence and also address the concerns of developing countries, even though if technical work or a part of the international standard development is delegated by international standardizing bodies to other relevant organizations (WTO, 2000)[22].

About transparency, WTO (2000) mentioned:

> *3. All essential information regarding current work programmes, as well as on proposals for standards, guides and recommendations under consideration and on the final results should be made easily accessible to at least all interested parties in the territories of at least all WTO Members Procedures should be established so that adequate time and opportunities are provided for written comments. The information on these procedures should be effectively disseminated.*
>
> *4. In providing the essential information, the transparency procedures should, at a minimum, include:*

[21] This is the object of concern of these authors: THORSTENSEN and VIEIRA (2015; 2016) and LIMA (2016).
[22] It is important to notice that WTO DS Appellate Body considered, in US-Tuna II (WT/DS381/AB/R, p. 372), that the TBT Committee Decision constitute a "subsequent agreement" within the meaning of Article 31(3)(a) of the Vienna Convention.

- The publication of a notice at an early appropriate stage, in such a manner as to enable interested parties to become acquainted with it, that the international standardizing body proposes to develop a particular standard;

- the notification or other communication through established mechanisms to members of the international standardizing body, providing a brief description of the scope of the draft standard, including its objective and rationale. Such communications shall take place at an early appropriate stage, when amendments can still be introduced and comments taken into account;

- upon request, the prompt provision to members of the international standardizing body of the text of the draft standard;

- the provision of an adequate period of time for interested parties in the territory of at least all members of the international standardizing body to make comments in writing and take these written comments into account in the further consideration of the standard;

- the prompt publication of a standard upon adoption; and

- to publish periodically a work programme containing information on the standards currently being prepared and adopted.

5. It is recognized that the publication and communication of notices, notifications, draft standards, comments, adopted standards or work programmes electronically, via the internet, where feasible, can provide a useful means of ensuring the timely provision of information. At the same time, it is also recognized that the requisite technical means may not be available in some cases, particularly with regard to developing countries. Accordingly, it is important that procedures are in place to enable hard copies of such documents to be made available upon request.

In terms of openness, the TBT Committee decision explains (WTO, 2000):

6. Membership of an international standardizing body should be open on a non-discriminatory basis to relevant bodies of at least all WTO Members. This would include openness without discrimination with respect to the participation at the policy development level and at every stage of standards development, such as the:

- proposal and acceptance of new work items;

- technical discussion on proposals;

- submission of comments on drafts in order that they can be taken into account;

- reviewing existing standards;

- voting and adoption of standards; and

- dissemination of the adopted standards.

7. Any interested member of the international standardizing body, including especially developing country members, with an interest in a specific standardization activity should be provided with meaningful opportunities to

> *participate at all stages of standard development. It is noted that with respect to standardizing bodies within the territory of a WTO Member that have accepted the Code of Good Practice for the Preparation, Adoption and Application of Standards by Standardizing Bodies (Annex 3 of the TBT Agreement) participation in a particular international standardization activity takes place, wherever possible, through one delegation representing all standardizing bodies in the territory that have adopted, or expected to adopt, standards for the subject-matter to which the international standardization activity relates. This is illustrative of the importance of participation in the international standardizing process accommodating all relevant interests*

When approaching the *"growing normative consensus on the need to 'democratize' global governance"*, BERNSTEIN and CASHORE (2007) affirmed[23]:

> *"The internal attention to democratic norm is increasingly matched by external expectations. States and international organizations, including the WTO, World Bank, ILO, and Food and Agricultural Organization, increasingly demand that the development and implementation of standards be inclusive, be transparent, include participation of stakeholders, and be adaptable to local conditions in order to be recognized as legitimate."*

HACHEZ and WOUTERS (2011) defined transparency as a meta-principle which *"can be defined as the level of access enjoyed by the relevant public to information about, from, or concerning the government entity and its activities".* And they added:

> *Without access of the public to such information, participation will be meaningless, and control will be curtailed This is why transparency is a major stake in struggles for increased accountability in global governance even though it should not be understood as a component of the notion of accountability itself, as is sometimes done, but rather as an enabler of accountability.*

Regarding inclusiveness, even though the WTO system considers that this is restricted to the 'openness' to its members, the DS Appellate Body already decided that the broad participation on standards development might constitute evidence that a body has a recognized role on standardization (WTO, 2012).

[23] (BERNSTEIN; CASHORE, 2007) also mentioned that *"As one NSMD system official explained, 'it's a chicken or egg' situation, where democratic expectations created by NSMD systems are feeding back to create expectations for all social and environmental standards, including those set by traditional standards setters such as the International Organization for Standardization (ISO)."* Even though, as before mentioned, NSMD system is not object of this research, the interplay between them and international standards set by ISO shall be mentioned, especially considering that legitimacy, transparency and the cited "democratic expectations" are object of concern in both cases.

Indeed, it is possible to deduce that the Appellate Body approached the legitimacy of international standards in US-Tuna II, while addressing the recognition of standardizing bodies (WTO, 2012):

> *Moreover, the definition of "international standardizing body" provides that the body's activities in standardization must be "recognized". The term "recognize" is defined as "[a]cknowledge the existence, legality, or validity of, [especially] by formal approval or sanction; accord notice or attention to; treat as worthy of consideration". These definitions fall along a spectrum that ranges from a factual end (acknowledgement of the existence of something) to a normative end (acknowledgement of the validity or legality of something). In interpreting "recognized activities in standardization", we will therefore bear in mind both the factual and the normative dimension of the concept of "recognition".*

The appellate body reaffirmed that the factual dimension of the concept of 'recognition' require, *"at a minimum, that WTO Members are aware, or have reason to expect, that the international body in question is engaged in standardization activities"* (WTO, 2012), a characteristic really close to the publicity or transparency referred in the TBT Committee Decision, above mentioned.

Further, in terms of the normative connotation of the concept of 'recognition', the WTO (2012) considered that:

> *to the extent that a standardizing body complies with the principles and procedures that WTO Members have decided "should be observed" in the development of international standards, it would be easier to find that the body has "recognized activities in standardization".*

Additionally, regarding the recognition of standardizing activity through acknowledgement of a body's standards, the Appellate Body affirmed (WTO, 2012):

> *We agree with the Panel that recognition of a body's standardization activities may "be inferred from the recognition of the resulting standard, i.e. when its existence, legality and validity [have] been acknowledged". While we regard the recognition of a body's standards by WTO Members and national standardizing bodies as highly pertinent evidence that a body has recognized activities in standardization, we do not consider that only a body whose standards are widely used can have recognized activities in standardization for the purposes of the TBT Agreement.*

> And later, WTO (2012) added:

> *Moreover, we find it difficult to see why an international organization that develops a single standard could not have "recognized activities in standardization" if other evidence suggests that the body's standardization activities are recognized, for example, if a large number of WTO Members participate in the development of the*

> *standard, acknowledge the validity and legality of the standard, or the body follows the principles contained in the TBT Committee Decision.*

Thus, it is possible to deduce that the Appellate Body considers necessary the compliance with a set of elements in order to acknowledge the 'recognition' of standardizing bodies.

Another point of attention is the credibility of the standard setters, as mentioned by ITC (2012a), which recognizes that, despite being a precondition for private standards to obtain legitimacy, credibility alone does not guarantee legitimacy. Credibility of those entities is, usually, intimately related to the compliance to principles mentioned in this section.

It is also important to say that these main elements of legitimacy of private standards are already established in the TBT's Code of Good Practice for the Preparation, Adoption and Application of Standards (Annex 3).

Actually, besides mentioning general principles of TBT like no less favorable treatment ("D") and that standards shall not be prepared, adopted or applied with a view, or with the effect of, creating unnecessary obstacles to international trade ("E"), the Code of Good Practice addresses transparency in its paragraphs "J", "O" and "P":

> *J. At least once every six months, the standardizing body shall publish a work programme containing its name and address, the standards it is currently preparing and the standards which it has adopted in the preceding period. A standard is under preparation from the moment a decision has been taken to develop a standard until that standard has been adopted. The titles of specific draft standards shall, upon request, be provided in English, French or Spanish. A notice of the existence of the work programme shall be published in a national or, as the case may be, regional publication of standardization activities.*
>
> *The work programme shall for each standard indicate, in accordance with any ISONET rules, the classification relevant to the subject matter, the stage attained in the standard's development, and the references of any international standards taken as a basis. No later than at the time of publication of its work programme, the standardizing body shall notify the existence thereof to the ISO/IEC Information Centre in Geneva.*
>
> *The notification shall contain the name and address of the standardizing body, the name and issue of the publication in which the work programme is published, the period to which the work programme applies, its price (if any), and how and where it can be obtained. The notification may be sent directly to the ISO/IEC Information Centre, or, preferably, through the relevant national member or international affiliate of ISONET, as appropriate.*

> *(...)*
>
> *O. Once the standard has been adopted, it shall be promptly published.*
>
> *P. On the request of any interested party within the territory of a Member of the WTO, the standardizing body shall promptly provide, or arrange to provide, a copy of its most recent work programme or of a standard which it produced. Any fees charged for this service shall, apart from the real cost of delivery, be the same for foreign and domestic parties.*
>
> (highlighted)

Inclusiveness and broad participation, therefore, appear on paragraphs "L", "M" and "N":

> *L. Before adopting a standard, the standardizing body shall allow a period of at least 60 days for the submission of comments on the draft standard by interested parties within the territory of a Member of the WTO. This period may, however, be shortened in cases where urgent problems of safety, health or environment arise or threaten to arise. No later than at the start of the comment period, the standardizing body shall publish a notice announcing the period for commenting in the publication referred to in paragraph J. Such notification shall include, as far as practicable, whether the draft standard deviates from relevant international standards.*
>
> *M. On the request of any interested party within the territory of a Member of the WTO, the standardizing body shall promptly provide, or arrange to provide, a copy of a draft standard which it has submitted for comments. Any fees charged for this service shall, apart from the real cost of delivery, be the same for foreign and domestic parties.*
>
> *N. The standardizing body shall take into account, in the further processing of the standard, the comments received during the period for commenting. Comments received through standardizing bodies that have accepted this Code of Good Practice shall, if so requested, be replied to as promptly as possible. The reply shall include an explanation why a deviation from relevant international standards is necessary.*
>
> (highlighted)

Even though the TBT's Code of Good Practice is 'open to acceptance' by any standardizing body within the territory of a Member of WTO, whether governmental or non-governmental bodies, Article 4 of TBT establishes that Members shall ensure that *"local government and non-governmental standardizing bodies within their territories, as well as regional standardizing bodies of which they or one or more bodies within their territories are members, accept and comply with this Code of Good Practice"*.

Article 4 also statues that members shall not take measures which have the effect of – directly or indirectly – requiring or encouraging standardizing bodies to act in a

manner inconsistent with the Code of Good Practice, and that their obligations shall apply irrespective of the standardizing body's acceptance of the Code of Good Practice.

It is possible to see, in Article 4, that WTO considers very important that the procedures of standards preparation, adoption and application comply with the principles of the Code of Good Practice in terms of international trade, establishing that the State Members may be liable for non-compliance with such principles even when standards setters' entities have not adhered to the Code of Good Practice.

That is why some authors nowadays defend that private standards shall be subjected to some sort of meta-regulation in the international trade field (THORSTENSEN; VIEIRA, 2015) which, according to ARCURI (2013), consists in setting the rules on how to produce and manage private regulatory schemes.

ISO and IEC are expressly mentioned in TBT's Annexes and ISO/IEC's definition guide most of the TBT's definition as it is possible to see in Annex 1. Moreover, the Code of Good Practice establishes that standardizing bodies that have accepted it or withdrawn from it shall notify this fact to the ISO/IEC Information Centre. Therefore, it is feasible to conclude that those organizations grant their recognition directly from the TBT Agreement.

However, there is a vast discussion about the effective compliance with the above-mentioned principles in terms of legitimacy of standards issued by ISO. The debate includes the composition of that organization and the interests that move their procedures in standard setting.

ISO is considered a hybrid actor (FONTANELLI, 2011). It is composed by 159 national standards body, expected to be the most representative standardization organization in its country, whether governmental or not (ISO, 2010)[24].

Even though it declares that effectively all its members *"comply with the principles set out in annex 3 of the WTO TBT agreement Code of Good Practice for the preparation, adoption and application of standards"*(ISO, 2010), FONTANELLI (2011) reminded that the organization was established in 1947 under the form of an association

[24] ISO (2010) elucidate that those organizations typically have a formal national permit from their government for voluntary standardization.

governed by Swiss corporate law and its primary stakeholder is the industry sector and ARCURI (2013) affirmed that there is a good amount of criticism on the status that ISO has in the WTO, where it has been stigmatized as a *"club dominated by private industrial groups"* where civil society has no real role to play and added:

> *ISO members are national standard bodies; many of which in turn are private non-profit groups, often dominated by private companies. Not only is civil society excluded from the decision-making process – it may not even exercise a critical role, as proposed standards are difficult to access. Even adopted ISO standards cannot be accessed free of charge but must be purchased. Such legitimacy and accountability issues may appear irreconcilable with the privileged status that ISO standards seem to have at the WTO.*

FONTANELLI (2011) also mentioned ISO procedures in standard setting:

> *Only ISO members are involved in decision making and participate in every phase of the norm-setting procedure (receiving drafts, providing comments, voting for the adoption); non-governmental organizations (NGOs), in contrast, can only serve as liaison organizations, a status that allows them to observe and comment upon the work of the Committees. The restrictive nature of the procedure continues after the adoption of the standards, which are not freely accessible to the general public, but are available to purchase.*

If the procedures adopted by ISO in preparation, adoption and application of standards are already debated, the possibility of the organization producing meta-regulation is also controversial, according to THORSTENSEN and VIEIRA (2015a). ARCURI (2013), on the other hand, affirmed that ISO produces meta-regulation and cites the International Social and Environmental Labeling (ISEAL) Alliance as one of the most successful organizations in meta-regulation.

Indeed, ISEAL, an association for sustainability standards which encompasses sustainability standards and accreditation bodies, developed Codes of Good Practices in setting standards, assuring compliance and monitoring impacts that guide their members (IISD; UNEP, 2014; ITC, 2012a and THORSTENSEN; VIEIRA, 2015a).

The Setting Social and Environmental Standards – ISEAL Code of Good Practice applies exclusively to sustainability standards that aim to achieve social, environmental or economic outcomes, operating at the international, regional, national or subnational levels (ISEAL, 2014b). It is underpinned by ISEAL Credibility Principles,

especially by six of them, which are: (i) improvement, (ii) relevance, (iii) rigour, (iv) engagement, (v) transparency and (vii) accessibility[25].

It is important to mention that ISEAL Credibility Principles resulted from a year-long global consultation with contributions from more than 400 stakeholders on five continents.

For the purpose of the present research, we will focus on three of these seven principles, especially considering that they are mentioned by most authors and documents cited here, which are engagement, transparency and accessibility.

ISEAL (2014b) defined the engagement principle such as:

> *Standard-setters engage a balanced and representative group of stakeholders in standards development. Standards systems provide appropriate and accessible opportunities to participate in governance, assurance and monitoring and evaluation. They empower stakeholders with fair mechanisms to resolve complaints.*

The relation of the above-mentioned principle with standard-setting is explained by ISEAL (2014b) through the need to grant stakeholders appropriate and accessible mechanisms of participation so that they feel that their views are represented in the consultation process and in decision-making.

In this sense, ARCURI (2013) considered that the effective participation of developing countries may motivate private regulatory regimes to become more inclusive systems of global governance.

Transparency principle, on its turn, is described by ISEAL (2014b) as:

> *Standards systems make relevant information freely available about the development and content of the standard, how the system is governed, who is evaluated and under what process, impact information and the various ways in which stakeholders can engage.*

Relating transparency to standard-setting, ISEAL Code of Good Practice (2014b) highlighted that information about the development of standards shall be freely and publicly available, including, *"at least, draft and final versions of the standard, information on governance (how decisions are made and by whom, and how to participate in decision-*

[25] The other ISEAL credibility principles are: sustainability, impartiality, truthfulness and efficiency (ISEAL, 2014b).

making and standards development) and information on consultation (stakeholders input and how it was addressed in standards development)".

When dealing with the principle of accessibility, ISEAL (2014b) stated that:

> *To reduce barriers to implementation, standards systems minimise costs and overly burdensome requirements. They facilitate access to information about meeting the standard, training, and financial resources to build capacity throughout supply chains and for actors within the standards system.*

Clarifying the relation between accessibility and standards-setting, ISEAL (2014b) also reassert that standards-setters must provide real opportunities for stakeholders to participate in the standard-setting process, identify and support disadvantaged stakeholders to participate through appropriated mechanisms, including regional visits and using local languages.

Compliance with these three principles is essentially required in three stages of standards development and revision, which are (i) public consultation, (ii) decision-making and (iii) standards availability.

During public consultation, ISEAL expressed as desired outcome that *"stakeholders have sufficient time and opportunity to provide input on the standard and can see how their input has been taken into account"* (ISEAL, 2014b).

Decision-making's desired outcome, in ISEAL's words (2014b), consists of stakeholders seeing that their views are reflected in decision-making. And, when it comes to standard's availability, ISEAL expected the standard to be accessible to interested stakeholders, requiring that all approved standards to be freely available, in electronic format, considering, though, that, *"the standard-setting organization shall make hard copies of public summaries, standards and other related materials available upon request at as low a cost as possible, and covering only reasonable administrative costs"*.

It is important to highlight that ISEAL's Credibility Principles and Code of Good Practices seek to disseminate that participation, transparency and accessibility to private standards shall be taken seriously in standard-setting procedures, and not just used as 'make believe'.

UN Forum on Sustainability Standards (UNFSS), in its turn, is a joint initiative of five UN agencies (FAO, ITC, UNCTAD, UNEP and UNIDO) with the aim to provide impartial information, analysis, and discussions on VSS and *"helps producers, traders, consumers, standard-setters, certification-bodies, trade diplomats, non-governmental organizations and researchers to talk to each other, find out more about Voluntary Sustainability Standards and influence decision makers at the intergovernmental level"*[26].

THORSTENSEN and VIEIRA (2015a) mentioned that private standards are included in the VSS structure and, about UNFSS, affirmed:

> *The UNFSS has become a forum for State actors to dialogue with each other and with some core groups, such as traders, consumers, producers, certification bodies, diplomats, NGOs and scholars. 'The overall goal of UNFSS activities is to make VSS a driver and avoid it being an obstacle to sustainable development in developing countries'. Moreover UNFSS intends to drive attention to the marginalization of smallholders and small and medium-sized enterprises. Such work might be accomplished through analytical procedures and activities, having exchanges of experiences and constructing a network among stakeholders.*

They also pointed out that *"the primary focus of UNFSS activities is on VSS developed by non-governmental organizations and private companies"* and that, in the UNFSS launching conference, held in 2013, *"there was acknowledgment of the importance of a national dialogue between key stakeholder groups VSS policies"* (THORSTENSEN; VIEIRA, 2015a).

Therefore, after citing some ongoing experimental initiatives, THORSTENSEN and VIEIRA (2015a) proposed a multilateral stakeholder structure which could gather together a large number of stakeholders, with more legitimacy to establish meta-regulation on private standards.

Similarly, discussing the legitimacy of SRI voluntary standards, RICHARDSON (2008) considered that more involvement of community groups and NGOs in designing the voluntary measures may enhance their public legitimacy.

It is possible, then, to conclude that international standardization process evolved in a context of fragmentation of international law and the increasing of private

[26] Information available at https://unfss.org/home/about-unfss/, accessed on 12 Feb 2019. THORSTENSEN and VIEIRA (2015a) mention that UNFSS consists of a platform of International Dialogue on VSS.

participation in economic regulation at all. In terms of international trade, WTO, attentive to this movement, has given special attention to the subject, since international standards, even though voluntary, can affect positively or negatively international trade. Similarly, several authors cited in this Chapter devoted attention to the issue, some of whom even advocate the adoption of meta-regulatory instruments.

Thus, along with the emergence of the discussion about the legitimacy of international standards, WTO, as well as other international entities, such as UNFSS and ISEAL, has established principles and codes of good practice for the development of international standards.

Among the most mentioned principles, the following are especially important for the present research: engagement, transparency and accessibility, since compliance with them may allow broader participation of developing countries in the international standardization process and ensure that their interests are met and, therefore, that the objectives of SDG 7 are effectively achieved.

It remains to be discussed, thus, whether the process of setting international standards for renewable energy actually follows these principles.

4. INTERNATIONAL STANDARDIZATION ON ENERGY

To discuss how international standards may contribute to the achievement of the SDG 7 targets, it is important to understand how they are developed and which are their objectives in the energy area, regarding especially renewable energy and developing countries.

That is why, in this Chapter, these issues are addressed, as well as the procedures of international standardization adopted by ISO and IEC and, in the end, one specific standard will be considered in order to understand how their provisions may contribute for the achievement of the SDG 7.

The development of renewable energy and the management of energy systems towards more efficient systems are actions that are highly dependent on technological development.

Therefore, the debate on the rising international cooperation and about the development and the use of international standards on these fields began more than a decade ago and it remains strong nowadays.

Indeed, international standardization on energy management and efficiency was discussed during the UN Industrial Development Organization – UNIDO's Expert Group Meeting on Industrial Energy Efficiency and Energy Management Standards, which took place on 21-22 in March 2007, where participants highlighted the need for consistency and harmonization in these sectors and the role of standards in achieving sustained best practices (IISD, 2007).

At that meeting, ISO's representative also informed the assignment of technical committees to energy efficiency and renewable energy standards, considering that were identified existing ISO standards with relevance to those sectors (IISD, 2007).

As a result of UNIDO's Expert Group Meeting, it was decided that the group would draft a statement in support of an international standard for energy management and

that an energy management working group would be created to work towards harmonization of existing national energy management standards (IISD, 2007).

In the 2007 EU-US Summit Statement on Energy Security, Efficiency and Climate Change it was also recognized the need to increase energy efficiency and share renewable energy in order to *"ensure access to affordable, clean, and secure sources of energy to underpin sustainable global economic growth and to protect our environment"* (CEU, 2007).

As one of the key priorities of the EU-US Joint Declaration above mentioned, was listed: *"research, develop and commercialize second-generation biofuels; overcome barriers to the use of renewable energy sources including through the development of international standards"* (CEU, 2007).

IEA, in an Information Paper written with ISO in support of the G8 Plan of Action, in June 2007, approached the multiple challenges to meet future energy needs in a more sustainable manner and, mentioning IEA's World Energy Outlook, demonstrated an alternative scenario, considering a more sustainable pathway (IEA, 2007):

> *By contrast, the Alternative Policy Scenario considers what would happen if the some 1 500 carbon abatement and energy security policies that are currently only partially implemented or under active consideration were to be fully implemented. In that case, global energy-related CO2 emissions would peak before 2030 and at a level 16% lower than in the Reference Scenario.* ***Some two thirds of the reductions are attributable to measures that raise end-use energy efficiency, 12% to increased use of renewable energy****, 10% to increased use of nuclear energy and* ***13% through improved efficiency and fuel-switching in the power sector****. Moreover, this scenario is less costly than the Reference Scenario, mainly because of the comparatively low cost of the end-use efficiency gains.* ***Thus the enhanced deployment of energy efficiency and renewable energy options could contribute almost 90% of all future carbon abatement efforts in the energy sector****. It is for this reason, and for the simultaneous advantages in terms of enhanced energy security and economic efficiency, that* ***there is a pressing need to guide the global energy economy further down the pathway of the Alternative Policy Scenario rather than continue following current trends.***
>
> (highlighted)

Thus, the paper analyzed the role of standards in a transition to more sustainable yet affordable energy solutions, considering that they allow measuring, comparing and reporting energy efficiency attributes on a common basis, and also (i) minimize product energy performance testing and verification costs for increasingly

globalized energy-using equipment markets; (ii) enable energy performance to be compared on a common basis across broad economic and political groupings; (iii) facilitate the adoption of more efficient product manufacturing, and (iv) accelerate transfer of best practice in policy settings (IEA, 2007).

It was also highlighted, back then, that international standards in the field of energy efficiency are not limited to measurement or definition of energy performance metrics (IEA, 2007):

> *They can include the means of testing, certifying and labelling energy performance and could also include broader system and process topics such as energy management and how to monitor, identify and verify energy savings delivered via diverse applications and programmes. The development and adoption of these broader standards is part of the infrastructure that will contribute to the development of more fungible and international energy-efficiency markets as they will hasten the day when energy efficiency can be bought and sold as an energy service commodity in the same way that electricity or gas can currently be traded.*

As an example, it is possible to mention that international standards can allow the creation of energy performance testing procedures worldwide, enabling the development of energy labeling and energy performance standards that encourage the development of more efficient products, such as domestic appliances (refrigerators, washers, driers, air conditioners, etc.), in order to reduce significantly the energy consumption of these items, spreading policies that already take place in countries like Brazil[27] or regions as European Union (IEA, 2007).

Considering the above mentioned, IEA and ISO have begun to cooperate on international standardization in the domain of renewable energy and energy efficiency in 2007, with the aim to analyze the existing portfolio of international standards, reviewing it and to *"facilitate the dialogue between policy makers and standards developers in selecting and prioritizing subject areas to be covered by International Standards supporting energy-efficient and renewable energy technologies and best practices"* (IEA, 2007).

In February 2008, ISO approved the establishment of the Project Committee 242 – 'Energy Management', with the purpose of developing the new ISO Management System Standard for Energy – ISO 50001. During the process of developing the before-

[27] In Brazil, PROCEL – Programa Nacional de Conservação de Energia Elétrica, among other functions, promotes the identification and the labelling of products according to its energy efficiency levels.

mentioned standard, there were regional meetings sponsored by UNIDO, to obtain inputs from industry sector. In Latin America, the meeting was held in Brazil, in August 2008, in cooperation with Associação Brasileira de Normas Técnicas – ABNT (UNIDO, 2008a; 2008b).

The commitment of UNIDO with international standards on energy efficiency and management on industry sector, its participation in ISO Project Committee 242 and its collaboration with the designing of ISO 50001 was also registered in the document 'UNIDO and Energy Eficiency – A low-carbon path for industry', where it was affirmed that *"Energy Management Standards constitute a demonstrated effective policy tool and market-based mechanism to bring about sustainable energy efficiency in industry"* (UNIDO, 2009).

In 2013, the International Renewable Energy Agency (IRENA) addressed this issue and drew up the report 'International Standardisation in the Field of Renewable Energy', as a result of an extensive study. About the very definition of international standard, IRENA (2013) stated that they result from collective work by experts in a field and provide a consensus about technical specifications or other precise criteria designed to be used consistently as a rule, guideline, or definition, that help make life simpler and increase the reliability and the effectiveness of many goods and services.

IRENA (2013) considered as renewable energy technologies the following: bioenergy, geothermal, hydropower, solar energy, wind energy and ocean energy, including tidal, wave and ocean thermal energy.

As before mentioned, IRENA (2013) informed that an inventory has identified more than 570 standards relevant to renewable energy technologies, most of them related to manufacturing and product standards, including test methods and performance evaluation. Additionally, it states that most part of those standards are developed at an international level, whether regionally or not.

Besides considering that the use of standards provides advantages for traders and economic operators, such as (i) the facilitation of common language and understanding of what the product or service is and what is not, (ii) facilitation of trade and contractual arrangements, (iii) facilitation of compliance to environmental requirements, (iv) facilitation of regulation and auditing, (v) improvement of stakeholder's confidence and (vi) enhanced

resource efficiency, IRENA (2013) recognized that *"the development of standards by consensus can present a risk of bias towards a specific company's technologies or group of technologies"*.

In terms of standards bodies, IRENA (2013) considers that, globally, there are four levels, which are: international, regional, national and standards-developing organizations, highlighting that the international standards bodies relevant to renewable energy are ISO and IEC, which appear to provide a good coverage of standards in most current renewable energy technologies, even though some technologies, products or process aspects are better served than others[28].

Indeed, the report shows that, out of 573 standards on renewable energies mentioned, 54,6% are international standards, 26,2% are regional ones, 2,3% are national standards and 16,9% are considered 'organizational standardizations', what demonstrates the important role of international standards on this matter[29].

Despite the number of identified standards concerning renewable energy technologies, IRENA (2013) affirmed that is noticeable that there is a gap concerning sustainability aspects, such as resource usage and carbon reporting, which apparently were not incorporated into the standards.

Besides that, the inventory analysis has also pointed out two important aspects concerning innovation and deployment of renewable energy, which were: (i) how standardization could better support innovative products and solutions and (ii) how globalized standards could also create barriers for developing products and solutions and for developing countries (IRENA, 2013).

The above-mentioned study presents 13 recommendations with the aim of improving the development of standards on renewable energies at international level, mainly concerning the engagement of stakeholders and developing countries, the reduction of costs,

28 IRENA (2013) also mentions the development of standards in partnership between ISO and European Committee for Standardization - CEN through a collaborative process governed by the Vienna Agreement and also between ISO and European Committee for Electrotechnical Standardization – CENELEC under the Dresden Agreement, where the large majority of European standards in the electrotechnical area are identical adoptions of international standards.

29 IRENA (2013) approaches standards according to the space where they produce its effects, such as international, regional or national. When it comes to organizational standards, IRENA (2013) relates to rules and codes of conduct that act as guidance for the standards production itself by standardization bodies.

the access facilitating, promotion of innovation, the effectiveness evaluation and environmental issues. In addition, IRENA (2013) considered:

> *There is also an important opportunity for policy-makers to further utilise international standards for the benefit of national regulations for renewable energy by providing detailed technical basis for laws and regulations in the energy sector, supporting tendering processes, and avoiding technical barriers to trade.*

In this report, IRENA (2013) also reaffirmed its belief that, with the suggested improvements, standards on renewable energy could be demystified and recognized as able to promote the deployment of renewable energy technologies and, therefore, to support climate change mitigation.

On the other hand, ISO's document 'ISO and energy', with the purpose to clarify *"why do we need ISO standards for energy"* affirms that *"increasing energy efficiency and the use of renewables is key to meeting the world's energy demands while contributing to global targets to reduce carbon emissions"* (ISO, 2016).

Likewise, the document states that ISO standards (i) represent consensus on concrete solutions and best practice for energy efficiency and renewables, (ii) help organizations reduce their energy consumption and adopt renewable energy technologies and also (iii) help the movement towards affordable and clean energy for all, *"one of the UN Sustainable Development Goals, the United Nations new roadmap to improve people's lives by 2030".*

ISO (2016) also notices that, out of a total of over 21300 international standards issued by that institution, more than 200 are related to energy efficiency and renewable energy, and others were in development at that time.

Besides ISO 50001 for energy management, which had issued, only in 2015, nearly 12000 certifications, ISO also maintains technical committees that also develop standards for energy, such as:

ISO/TC 265 – Carbon dioxide capture, transportation, and geological storage

ISO/TC 301 – Energy management and energy savings

ISO/TC 163 – Thermal performance and energy use in the built environment

ISO/TC 205 – Building environmental design

ISO/TC 207 – Environmental management

ISO/IEC JTC/SC 39 – Sustainability for and by information technology

ISO/PC 252 – Natural gas fuelling stations for vehicles

ISO/TC 22/SC 37 – Electrically propelled vehicles

ISO/TC 197 – Hydrogen technologies

ISO/TC 117 – Fans

ISO/TC 115 – Pumps

ISO/TC 184 – Automation systems and integration

ISO/TC 180 – Solar energy

ISO/TC 238 – Solid biofuels

IEC is another non-profit organization that prepares and publishes international standards, specialized in 'electrotechnology': electrical, electronic and related technologies. It was founded in 1906 and its members are national committees[30] that appoint experts and delegates from its industries, government bodies, associations and academia who join the IEC's technical committees. IEC is composed by 173 countries (86 members and 87 affiliates) and its standards cover a large amount of technologies, such as power generation, transmission and distribution, home appliances, office equipment, semiconductors, fiber optics, batteries, flat panel displays and solar energy[31].

Addressing the challenges for the development of renewable energy worldwide, such as reliability, efficiency and high start-up and initial running costs, IEC states that standardization helps technologies to become marketable by providing a foundation for certification systems, promoting international trade of uniform high-quality products and supporting transfer of expertise from traditional energy systems (IEC, 2017).

Therefore, consensus-based international standards are published, usually in periods shorter than 12 months, by IEC technical committees (TCs), which, on renewable energies, encompasses the ones mentioned below:

[30] List of members: http://www.iec.ch/dyn/www/f?p=103:5:0, accessed on 26 May 2018.
[31] Information available on http://www.iec.ch/renewables/iec.htm, accessed on 26 May 2018.

TC 4: Hydraulic turbines

TC 82: Solar photovoltaic energy systems

TC 88: Wind turbines

TC 114: Marine energy – wave and tidal energy converters

TC 117: Solar thermal electric plants

TC 105: Fuel cell technologies

In the field of certifications, there are also IECEE – IEC System for Conformity Testing and Certification of Electrotechnical Equipment and Components, which includes, for photovoltaics, an IECEE PV Scheme, IEC System of quality of electronic components, materials and processes – IECQ, Certification of Equipment operated in explosive atmospheres – IECEx and Renewable Energy Systems – IECRE (IEC, 2017).

Regarding water power, IEC develops standards both for rivers and oceans' energy, among which are ones that address evaluation and mitigation of environmental impacts of these activities. In the domain of solar power, IEC prepares standards both on photovoltaic modules and in concentrated solar power systems, either off-grid systems and grid-connected ones (IEC, 2017).

IEC also works on developing standards that deal with safety, measurement techniques and tests procedures for wind turbine generator systems, design requirements for offshore wind turbines, gearboxes and wind farm power performance testing, on power performance measurements and other issues in the field of wind power (IEC, 2017).

IECRE was created in order to foster the growth of the renewable energy sector by providing testing, inspection and certification for sectors such as wind energy, marine energy and solar photovoltaic energy (IEC, 2017).

The IEC established the Advisory Committee on Environmental Aspects (ACEA) with the aim to coordinate its technical committees and subcommittees to help them address environmental issues when preparing their standards, since it recognizes the important role of electrotechnical standardization to foster sustainable development and energy efficiency (IEC, 2017).

Considering the large number of previous-cited organizations that develop international standards and the significant number of standards and certifications in the energy sector, it is feasible to say that both organizations and standards in this field are increasingly focused on energy efficiency and management and on renewable energy sources, reducing energy consumption and carbon emissions, seeking to achieve sustainable development.

Notwithstanding, harmonization among this large number of standards produced in the field of energy is a relevant and constant concern, as shows IRENA (2013), that affirmed that it is recognized by the majority of stakeholders, including governments around the world, that standards function best when they are harmonized.

4.1. THE ROLE OF INTERNATIONAL STANDARDS IN RENEWABLE ENERGY

The role of international standards is also subject of a vast controversy. There are opinions in favor and others against its potential benefits. Besides, there is a reasonable discussion as to whether or not they constitute barriers to international trade.

In this sense, IEA (2007), considering that international standards could provide *"a consistent and clear frameworks describing technologies and good practices in the fields concerned, including, inter alia, terminology, classifications, test methods, performances (...) and good management practices"* and, also, *"state-of-the-art knowledge formalized by recognized experts in the field, based on international consensus from a balance of interests reflecting the technological, economic and public interest conditions in the vast majority of the countries of the world"*, pointed out that international standards are able to:

- *reduce uncertainty for all the economic players, thus creating a climate favourable to public-private partnership for accelerating the development and marketing of more energy-efficient products and renewable energy sources;*
- *support international trade of goods and services in these fields and the development of new markets, and*
- *help to significantly improve consumer/user understanding and confidence and thus influencing consumer/user behaviour and choices.*

Similarly, when approaching the advantages of adopting international standards for public authorities, IEA (2007) cites:

> - *International Standards can be helpful in supporting cooperation and potential harmonization of public policies in the fields concerned;*
> - *With International Standards, governments can have immediate access to a significant portfolio of documents covering energy efficiency in a variety of domains (buildings, household appliances, industrial products and processes, etc.) and a variety of renewable energy sources;*
> - *the Standardization system offers the opportunity to develop, as quickly as demanded, technical solutions addressing requirements and priorities set by public authorities, involving all the concerned parties in an open, transparent and efficient process;*
> - *International Standards are fully compliant with the requirements set by the Agreement on Technical Barriers to Trade of the WTO, and are used worldwide as instruments facilitating the elimination of unnecessary barriers to trade and, whenever needed, as a suitable basis for technical regulations.*

When organizing the UNIDO-ABNT Regional Meeting in August 2008, specifically energy management standards were taken into consideration, and positively described as it follows (UNIDO, 2008a):

> *Energy management standards constitute a proven market-based mechanism for industry to reduce operating costs and increase profitability through sustainable energy efficiency. They offer an expert and best practices-based framework for organizations and enterprises to develop energy efficiency goals, create plans to achieve those goals, prioritize efficiency measures and investments, monitor and document results and ensure continuity and constant improvement of energy performance.*

Otherwise, CAVALCANTI *et al* (2013), in the preface of a study published in 2013 by São Paulo's Industrial Federation – FIESP named 'International Commerce of Energy's Regulation', mentioned that:

> *In all our studies, as well as in the seminars discussions, the regulatory issue was one of the main difficulties identified in the implementation of greater regional integration of energy and the global trade in energy sources. This because the different international regulatory frameworks related to the discipline present gaps and contradictions rules that make predictability difficult and increase the operating costs of economic actors.*

CAVALCANTI *et al* (2013) recognized, in the mentioned study, that there is an international movement to increase the production of energy from renewable sources and,

therefore, the importance of the international trade regulation in environmental goods and services[32].

FIESP's study, conducted together with FGV, affirmed that the principle of sustainability itself can act as a technical barrier, because, when applied through the processes of production methods that are not in line with WTO rules, it can influence the production, marketing and consumption of energy products and services. As an example, it cites the EU Directive 2009/28/EC, which establishes a sustainability regime to transport fuels and bioliquids used in other sectors, such as electricity, heating and cooling (CAVALCANTI *et al*, 2013). It also states (in free translation):

> *In principle, such sustainability arrangements would be in line with WTO rules. However, it is discussed whether the sustainability criteria and certification of biofuels contained in the European Directive will affect the production and export of biodiesel to Europe. It would be questionable whether the measures adopted by the EU would act as barriers to international trade, since the cost that countries like Malaysia and Indonesia will bear to adapt their infrastructure to the new European rules is high and may even make the activity economically unfeasible.*

Therefore, it is a possible conclusion that regulatory measures, such as technical regulations or standards, may be considered good to trade, depending on their nature or objectives (ARCURI, 2013; THORSTENSEN; VIEIRA, 2016), or constitute disguised protectionist measures, affecting negatively the international trade (MARCEAU, 1999; THORSTENSEN; VIEIRA, 2016; SYKES, 2017).

As previously mentioned, IRENA (2013) had addressed this issue. Even though it admitted that, *"when poorly designed, standardisation may inhibit innovative solutions, create administrative burdens, increase costs and inhibit trade"*, it affirmed that, when well designed, standardization provides an effective framework for the commercialization and diffusion of technologies by harmonizing information flow, understanding technical product design for interoperability of components, manufacturing and service requirements, as well as establishing common rules and quality requirements. And it continues (IRENA, 2013):

[32] The study also indicates the lack of a definition for the concept of environmental goods and services accepted by the international community. It refers, then, to the OECD and Eurostat' one, which is *"those which provide environmental protection in different domains: water, solid waste, air, soil, noise, natural resources, and miscellaneous services"*.

> *Well written standards have an important role to play in supporting communication and understanding, trade and commerce, legislation and regulation, environmental protection, enhanced resource efficiency and confidence in the products and services provided.*
>
> *However, standards can also potentially be barriers to the above if written poorly, biased to one set of stakeholders' requirements, or if their requirements restrict the ability to innovate or deploy and trade the technologies or services.*

IRENA (2013) also affirmed that standards can ensure harmonization of products and services and, in this sense, they allow an open market approach to trade and commerce and an increase in global tradability and compatibility of products and services. In addition, it registers that there is a potential for using standards to support a developing country or market and that, if standards are harmonized from an international source, the ability to support competitive advantage through the selection of standards giving an advantage to one set of technologies over another is diminished.

ARCURI (2013), on its turn, affirmed that transnational private standards have contributed to enhancing the process of economic globalization.

However, IRENA (2013) acknowledges that the ability to influence the standards for the benefit of a particular stakeholder group or company's needs had been intensified due to the closer relationship of the standards to regulatory and legislative deployment of renewable energy technologies, services and products, and the increased global trade.

The role of international standards as barriers to international trade or as mechanisms of harmonization that are able to foster technological deployment in the field of renewable energy is even more accentuated when addressing specifically developing countries, which are more dependent on foreign technology and face more difficulties in developing national technologies in either renewables and energy efficiency.

Such harmonization, according to ARCURI (2013), is problematic insofar as it does not reflect the fact that private regulatory regimes often compete and defend different views of what constitutes a good society.

If we consider, as IRENA (2013), that standardization could better support innovative products and solutions, but, on the other hand, that globalized standards could also create barriers for developing products and solutions, especially for developing

countries, it is possible to understand that international standards on renewable energies can either promote or prevent the achievement of SDG 7.

Therefore, regulatory coherence on renewable energy and energy efficiency and management and international standardization are able to play an important role on the achievement of SDG 7, considering the relevance of renewable energy, energy efficiency and new technologies deployment to ensure access to affordable, reliable, sustainable and modern energy for all.

As abovementioned, standards – if well designed[33]– can contribute to stimulate research, deployment and implementation of new technologies that may allow the exploitation of new sources of clean energy, the achievement of efficiency in energy consumption and in renewables, the provision of sustainable energy services and necessary infrastructure building.

One of the keys for reaching those goals is regulatory convergence, along with mechanisms of legitimacy, since this is the way to grant a minimum grade of uniformity to renewable energy regulations. Through this, is also possible to promote better international trade and, consequently, to approach economic and social development.

Otherwise, if poorly designed, standards may prevent the achievement of this important goal, since, as it was also previously stated, they may impose obstacles to international trade, to the deployment of new technologies and to economic development, by, for example, creating technical barriers to trade.

That is why is very important to pay close attention on how those standards may be better designed in order to effectively contribute to the SDG 7 achievement internationally.

[33] IRENA (2013). RICHARDSON (2008) affirms that some companies are *"averse to overly vague standards, as ambiguity can generate normative confusion, as well as the potential for 'free-riding' by unscrupulous businesses".*

4.2. INTERNATIONAL STANDARDS ON RENEWABLE ENERGY, ENERGY EFFICIENCY AND MANAGEMENT IN DEVELOPING COUNTRIES

Developing countries are usually highly dependent on foreign technology and face more difficulties in developing its own technology in many sectors, among them is the field of renewable energy as well as energy efficiency and management.

Therefore, it is very important to analyze the effects of international standards on developing countries in those fields, namely if they constitute trade barriers or important tools for development.

In this sense, MCKANE *et al* (2009) analyzed the preparation of ISO 50001, highlighted UNIDO's active support in its development process, by facilitating the participation of developing countries and emerging economies through regional and international workshops and a survey on energy management in industry, with the objective of understanding *"the potential opportunities, barriers and challenges for industry in adopting and implementing energy management standards".*

MCKANE *et al* (2009) addressed also the so-called *"information and technical capacity gap challenge"* and recognized that *"the adoption of voluntary standards is heavily dependent on the existence of supporting programs and incentives".*

Both IEA (2007) and IRENA (2013), previously cited, addressed the potential benefits of international standards for public authorities of countries which adopt them, such as supporting cooperation and potential harmonization of public policies, the opportunity to develop technical solutions and the benefit of national regulations for renewable energy.

IRENA (2013) pointed out the relevance of international standards for emerging economies and the importance of their participation throughout the process of its development:

> *A key message from this study is that if standards are to remain of global relevance then the international standardisation route should support all regional, demographic, technical development, societal and environmental aspects of their use.* ***This is particularly relevant in developing countries, where issues of cost, capacity or resource availability limit their involvement in the whole international standards development process. Consequently, international standards may not always consider specific issues relevant to some regions, such as specific climate conditions, infrastructure development or skills available for***

> ***implementing renewable energy systems.*** *It is therefore important to make use of existing mechanisms, and develop new ones, to ensure the engagement of all stakeholders, particularly in developing countries, in the international standardisation process. This engagement is especially relevant if those stakeholders are to be involved in competitive and inclusive global trade. Examples of such existing mechanisms include the ISO-DEVCO and the IECAffiliate Country Programme. Furthermore, participation in the standardisation process also facilitates a voluntary cooperation of public and private actors and the transfer of knowledge. Efforts must therefore continue to explore new options for increasing the participation and contribution of developing countries in the international standards development process.*
>
> (g.n.)

The difference between the developed countries' concern about major energy issues and the developing countries' concern about issues like the development of affordable energy in isolated areas and how to train people with the skills to run and maintain the equipment is remarked by IRENA (2013), that claimed that, for the latter, renewable energies deployment is not intended solely for energy generation, but also represents an opportunity to develop better standards of living, as well as to improve health, create economic growth opportunities, extend agriculture growing periods and so forth.

That is why IRENA (2013) stated that standards-makers need to be sensitive and fully understand the implications and support needed in developing countries when standards are used, since, although technologies might be the same in developed and developing countries, their implementation and requirements are often driven by different needs and issues.

Considering that the participation of developing countries in the standardization process is essential to guarantee that these differences will be properly considered, IRENA (2013) issued the Recommendation 11 – *"Engagement from developing countries in existing programmes that may support their involvement in the standardisation process for renewables is crucial"*.

In this sense, IRENA (2013) mentioned that ISO has a long-established policy committee (DEVCO) to specific address the needs of developing countries and that IEC has established the Affiliate Country Programme, which will be better detailed forward.

Otherwise, having in mind that the effective participation can be costly and recognizing the need to reduce the expenses to engage more developing countries and experts worldwide, IRENA (2013) issued the Recommendation 12 – *"Options for using the*

latest communication technologies tor engagement in standardization development work need to be explored", even though it recognized the need of training for those engaged in the conferencing, as well as of technical staff, communications device and facilities with translation capabilities.

Indeed, as before discussed, international standards can act both as barriers to developing countries when establishing technological requirements far beyond those nationally available and as tools for fostering technological transfer, national technological deployment and to ensure greater market access, depending on how they are designed.

That is why a large number of international documents approach capacity building, technical assistance and technology transfer issues, especially concerning developing countries. As examples, it is possible to cite Vienna Energy Efficiency and Climate Meetings Bulletin (IISD, 2007) and Informal Summary on United Nations Summit on Sustainable Development 2015 (UN, 2015d).

On the other hand, they can hinder access to higher cost technologies, require qualification and training of unskilled professionals to deal with some very technical and specific standards, such as those applicable to renewable energy, energy efficiency and management.

In this regard, it is necessary to ensure that the developing countries participate in the whole process of development of international standards and that, as a result, the standards on renewable energy, energy efficiency and management get to be minimal, flexible and adaptable to different social, economic and even environmental realities, so that they can be effective worldwide.

4.3. IEC PROCEDURES FOR THE DEVELOPMENT OF INTERNATIONAL STANDARDS ON RENEWABLE ENERGY

IEC was founded in 1906 and, nowadays, is the world's leading organization for the development and publication of international standards for electrical and electronic technologies, collectively known as 'electrotechnology', being one of the three global

organizations – together with ISO and International Telecommunication Union (ITU) – that develop international standards for the world.

It describes itself as a neutral, independent, not-for-profit membership organization, where each member represents all national stakeholders in electrotechnology and has a single vote within the organization, with the same weight in the decision-making process (IEC, 2018b).

IEC's numbers are impressive. There are, currently, over 200 technical committees and subcommittees which gather close to 20000 experts from the private and public sectors, four global CA systems[34], more than 10000 publications, among which 6755 are international standards, 401 published only in 2018, when there were 1594 active projects (IEC, 2018b).

Until December 2018, IEC was composed by 86 member countries and 85 affiliate countries. IEC's Affiliate Country Programme was launched in 2001 with the objective to offer developing countries around the world the opportunity to participate in the organization without the membership costs, allowing them to use and adopt IEC international standards and benefit from its CA Systems.

Through the programme, the affiliate countries receive 200 free IEC international standards for adoption as national standards[35] and (i) can nominate up to five experts, (ii) have electronic access to working documents of a technical committee and its subcommittees, (iii) its experts may comment and/or submit questions on working documents, (iv) its experts can take part in technical meetings during the annual IEC General Meeting and (v) are encouraged to establish a National Electrotechnical Committee – NEC (IEC, 2018a).

When it comes to conformity assessment, the Affiliate Conformity Assessment Status (ACAS) offers Affiliate Countries benefits such as e-learning modules,

[34] IECEE, IECEx, IECQ and IECRE

[35] Affiliate Plus Countries receive 400 free IEC international standards for adoption and mentoring for national electrotechnical committees. To be granted the Affiliate Plus status, an Affiliate Country shall have (i) officially declared the adoption of at least 50 IEC international standards as national standards, (ii) established a National Electrotechnical Committee (NEC) that has representatives from both the private and public sectors and (iii) made a commitment to support Affiliate Country Programme activities.

regional workshops, online resources and observer stats at management meetings (IEC, 2018a).

The technical work developed in IEC observes the ISO/IEC Directives Part 1 consolidated with IEC Supplement – Procedures for the technical work – Procedures specific to IEC.

IEC is composed by a Standardization Management Board (SMB), which is responsible for the overall management of technical work for consensus international standards and, among other activities, for the establishment of technical committees and the appointment of their chairs.

Proposals for work in new fields of technical activity that may require establishment of new technical committees may be made in IEC by (i) national committees, (ii) technical committees or subcommittees, (iii) project committee, (iv) policy level committee, (v) the Standardization Management Board, (vi) general secretary, (vii) bodies responsible for managing a certification system operating under the auspices of the organization and (viii) another international organization with a national body membership (ISO; IEC, 2019).

According to ISO and IEC procedures (2019), the proposal shall be circulated by the General Secretary to all the national committees for expression of interest in supporting it and in actively participating in the work of the new technical committee. The establishment of a new technical committee by the SMB depends on a 2/3 majority of the national bodies voting in favor of the proposal, and at least 5 national bodies who voted in favor expressed their intention to participate actively (ISO; IEC, 2019). Similar procedures apply to the establishment of subcommittees.

All national committees may participate in IEC's technical committees or subcommittees and they are required by the organization to clearly indicates, regarding to each technical committee or subcommittee, if they intend to participate actively in the work (P-members) or to follow it as an observer (O-members).

The difference between the status of the participation in technical committees or subcommittees is that, while P-members have the obligation to vote on all questions formally submitted for voting, such as new work item proposals, enquiry drafts and final

drafts, and to contribute with the meetings, O-members receive committees documents and have the right to submit comments and to attend meetings.

Regardless of the status of national committee members, all of them have the right to vote on enquiry drafts and on final draft of international standards.

Chairs of the technical committee are nominated by its secretariat and approved by the SMB. The secretariat itself is allocated by the SMB to a national committee that has indicated its intention to participate actively in the work of that technical committee or subcommittee and that has accepted to fulfil its responsibilities as secretariat and is in a position to ensure that adequate resources are available for secretariat work. After that, the national committee shall appoint a qualified individual as secretary. (ISO; IEC, 2019).

Technical committees or subcommittees shall develop or maintain international standards, although they are also encouraged to consider the publication of intermediate deliverables such as technical specifications.

The technical work is guided by a strategic business plan designed for the specific field of activity of the technical committees or subcommittees taking into consideration, among other factors, the business environment and a prospective view on emerging needs. It must be formally agreed upon by the technical committee or subcommittee and approved by SMB.

According to ISO and IEC (2019), when establishing target dates in the programme of work of technical committees or subcommittees, priority shall be given to projects intended to lead to international standards upon which other international standards will depend for their implementation, notwithstanding, the highest priority shall be granted to projects that might produce a significant effect on international trade, recognized as such by the SMB.

Technical committees or subcommittees must appoint a project leader for the development of each project, who *"shall act in a purely international capacity, divesting him or herself of a national point of view"* (ISO; IEC, 2019).

The project carried out by the technical committees or subcommittees is developed in seven stages, which are: (i) preliminary, (ii) proposal, (iii) preparatory, (iv) committee, (v) enquiry, (vi) approval and (vii) publication.

In the preliminary stage, technical committees or subcommittees may introduce preliminary work items that are not yet sufficiently mature for further stages into their work programmes, by a simple majority vote of their P-members. Therefore, this stage can be used either for the elaboration of a new work proposal item – a new standard, a new part of an existing standard, a technical specification or a publicly available specification – and for the development of an initial draft.

The proposal of a new work item within the scope of the existing technical committees or subcommittees may be made according to the appropriated procedures by (i) a national body, (ii) the secretariat of that technical committee or subcommittee, (iii) another technical committee or subcommittee, (iv) an organization in category A liaison[36], (v) the SMB or one of its advisory groups and (vi) the General Secretary (ISO; IEC, 2019).

During the proposal stage, it is required to have sufficient information for the debates, in order to support informed decision making by national bodies. With that in mind, the general secretary or the relevant committee chair and secretariat may consult interested parties, including SMB or committees conducting related existing work and, if necessary, an *ad hoc* group (AhG) may be established to examine the proposal.

The proposal shall be circulated to the members of the technical committee or subcommittee for P-member ballot and to the other members for information. When voting negatively, national bodies shall justify their votes, otherwise they might not be registered or considered. If the new work item proposal is approved, the result of the vote shall be issued according to ISO/IEC procedures and the enquiry draft ballot shall continue (ISO; IEC, 2019).

Vote counting excludes abstentions and the acceptance of the new work item requires approval of 2/3 majority of the P-members of the technical committees or

[36] Organizations that make an effective contribution to the work of the technical committee or subcommittee for questions dealt with by this technical committee or subcommittee. Such organizations are given access to all relevant documentation and are invited to meetings and they may nominate experts to participate in working groups.

subcommittees and, concomitantly, a commitment of at least 4 P-members, in committees with 16 or fewer P-members, or 5 P-members, in committees with 17 or more P-members, to participate actively in the development of the project, by making effective contributions at the preparatory stage, by nominating technical experts and by commenting on working drafts[37].

The proposal stage is concluded with the inclusion of the project in the programme of work of the technical committee or subcommittee.

During the preparatory stage, technical experts appointed shall debate and prepare a working draft in conformity with ISO/IEC Directives, Part 2. The stage is concluded when a working draft is available for circulation to the members of the technical committee or subcommittee as a first committee draft. It also may result in a publication of a Publicly Available Specifications (PAS)[38].

In the committee stage, a committee draft is circulated for both P-members and O-members for consideration and national bodies shall submit their comments on the technical content. All comments must be considered and responded by the committee, with a view to reach consensus[39].

Successive drafts may be submitted to comments and debates until consensus of P-members is reached about the technical content. Otherwise, the project may be abandoned or deferred by decision of the technical committee or subcommittee.

If the consensus is reached, what shall be assessed by the leadership (ISO; IEC, 2019), the secretariat submits the digital final version to the general secretary for the distribution to the national members for enquiry.

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[37] Exceptionally, in cases where it can be documented that the industry and/or technical knowledge exists only with a very small number of P-members, then the committee may request permission from the SMB to proceed with fewer than 4 or 5 nominated technical experts (ISO; IEC, 2019).

[38] *"A PAS may be an intermediate specification, published prior to the development of a full International Standard, or, in IEC may be a "dual logo" publication published in collaboration with an external organization. It is a document not fulfilling the requirements for a standard. A PAS is a normative document."* (ISO; IEC, 2019).

39 The definition of consensus used in ISO/IEC Directives is the one given in ISO; IEC (2004): *"consensus: General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments. NOTE Consensus need not imply unanimity."*

The resolution of all technical issues and the acceptance of the committee draft for circulation as an enquiry draft imply the end of the committee stage. If technical issues are not completely resolved and, therefore, consensus was not reached in terms of international standard, the technical committee or subcommittee may publish an intermediate deliverable in the form of a technical specification.

In the enquiry stage, the draft circulates to all national bodies for vote. Votes submitted shall be explicit: positive, negative or abstention. Abstention and negative votes unaccompanied by technical reasons are also excluded.

Committees are required to respond to all comments received and to make every attempt to resolve negative votes (ISO; IEC, 2019).

An enquiry draft is approved if it gets 2/3 majority of the votes of P-members of the technical committee or subcommittee are in favor and no more than 1/4 of the total number of votes cast are negative.

If the draft is approved and technical changes are not necessary to be included, it proceeds directly to publication. If it is approved with a need to include technical changes, it shall be registered, with the modifications, as a final draft international standard.

Therefore, the enquiry stage ends either with the publication of an international standard or with the circulation of its final draft.

In case of circulation of a final draft international standard for national bodies to vote, the approval stage occurs. Here, procedures for votes and approval are the same as in the enquiry stage, except that further editorial or technical amendments are not acceptable at this stage[40], reason why every comment received in this stage will be recorded as ‘noted for future consideration’ (ISO; IEC, 2019).

If the final draft is approved according to ISO/IEC procedures, it shall proceed to the publication stage. Otherwise, if it is not approved, the draft returns to the technical committee or subcommittee, which may decide to resubmit a modified draft as a committee

[40] Notwithstanding, the secretary and the secretary general may seek to resolve obvious editorial errors (ISO; IEC, 2019).

draft, enquiry draft or final draft international standard, publish a technical specification or cancel the project.

The publication stage, on its turn, consists in the printing and distribution to the international standard.

ISO and IEC also established procedures for review and maintenance of international standards in order to keep them updated, but they will not be detailed here, since they are not an object of the present research.

After the publication, international standards are available on IEC Webstore for purchase. Publications are priced in swiss francs (CHF) and their prices vary a lot. They may be acquired in electronic versions, through download, or hardcopies sent to the buyer's address.

The digital publication purchased may be shared with multiple users if the license considered its use in 'multiple workstations' or for 'networking with simultaneous users', what implies the multiplication of its price for different factors, according to the number of users. This shared licenses also may be national or international and, in this case, the factor of multiplication also varies according to its use[41].

IEC also offers online collections, which encompasses access to all the publications related to the main topic, including the updated editions, through an annual subscription. For instance, the online collection of IEC 61400 – Wind Turbines contains 27 active and 12 withdrawn publication and costs CHF 550 per year (equivalent to U$ 560).

Notwithstanding, due to a cooperative agreement with the World Bank Group and the United Nations Foundation, IEC offers standards supporting rural electrification to developing countries at discounted prices (50% to 75%), aiming to contribute to grant access to people without it or with only limited access and, therefore, to the achievement of one of the targets of SDG 7.

[41] Detailed information: https://webstore.iec.ch/webstore/webstore.nsf/xpFAQ.xsp?Open&id=GFOT-7NPP8H, accessed on 26 Nov 2019.

4.4. IEC TECHNICAL COMMITTEES AND INTERNATIONAL STANDARDS WITH FOCUS ON IEC 61400-1:2019 – WIND ENERGY GENERATION SYSTEMS – PART 1: DESIGN REQUIREMENTS

According to the previously mentioned procedures, international standards development in IEC occurs through technical committees. Among them, it is worth mentioning the TC 111 – 'Environmental standardization for electrical and electronic products and systems', with the scope of producing horizontal standards of environmental aspects, in close cooperation with product committees of IEC and monitoring closely the corresponding regional standardization activities worldwide, aiming to become a focal point for discussions concerning standardization.

Even though TC 111 liaises with product committees in the elaboration of environmental requirements for product standards, seeking to foster common technical approaches and solutions, assuring, then, consistency in IEC's standards, product committees remain autonomous in dealing with the relevant environmental aspects.

However, by creating technical committees with the scope of developing horizontal standards and connecting with specialized technical committees, IEC strongly expresses its concern about the regulatory coherence of its standards. Indeed, among the strategic objectives of TC 111, for example, are (i) the harmonization of environmental terminology in the scope of TC 111 and (ii) the development of a standardization document that specifies environmental performance criteria which are common across product sectors and may be harmonized for consistency.

The chair of TC 111 is currently held by a French member and its Secretariat, by an Italian member. It is made up of members from the national standards bodies of 35 countries, according to the table below:

Table 2 – TC 111 Members

TC 111 Members	
P-Members	**O-Members**
Belgium	Austria
Brazil	Belarus
Canada	Israel
Switzerland	Pakistan
China	Poland
Czech Republic	Romania
Germany	Russian Federation
Denmark	Slovenia
Egypt	Slovakia
Spain	South Africa
Finland	
France	
United Kingdom	
Ireland	
India	
Italy	
Japan	
Korea, Republic of	
Mexico	
Malaysia	
Netherlands	
Norway	
Sweden	
Thailand	
United States of America	

Considering that the results of the TC 111 will be horizontal standards, as well as uniform terminology and product design in terms of environment aspects, it is

certainly a very important playing field for developing countries, on the premise that regulatory coherence and uniformity of standards and terminology enables effective technology transfer and capacity building.

However, it is possible to see that the vast majority of TC 111 members are developed countries.

Another technical committee which is worth mentioning for the purposes of this research is the TC 88 – 'Wind energy generation systems', with the objective to produce standards in a broad field which includes wind turbines, wind power plants, onshore and offshore and interaction with the electrical systems to which energy is supplied.

TC 88's strategic business plan registers that standards on wind energy generation systems are expected to address site suitability and resource assessment, design requirements, engineering integrity, modeling requirements, measurement techniques, test procedures, operation and maintenance, site-specific conditions, all systems and subsystems of wind turbines and wind power plants, such as mechanical, and electrical systems, support structures, control and protection as well as communication systems for monitoring, centralized and distributed control and evaluation, implementation of grid connection requirements for wind power plants, and environmental aspects of wind power development.

The relevance of standards developed by TC 88, among other factors, lies in the fact that wind energy has become the most cost effective new renewable energy source and also in the constant technological improvements of the sector.

Indeed, challenges faced by TC 88 varies from the development of new airborne wind turbines by few new companies, which, if feasible in the future, may require a specific set of standards to address their unique features, to the increasing trend in the variety of wind turbines available on the international market, with different sizes and characteristics, that allow better adaptation to the wind conditions of each location.

The chair of TC 88 is currently held by a North American member and its Secretariat, by a Danish member. It is made up of members from the national standards bodies of 40 countries, according to the table below:

Table 3 – TC 88 Members

TC 88 Members	
P-Members	**O-Members**
Austria	Brazil
Bahrein	Bulgaria
Belgium	Egypt
Canada	Hungary
China	New Zealand
Czech Republic	Poland
Denmark	Romania
Finland	Serbia
France	Ukraine
Germany	
Greece	
India	
Iran	
Ireland	
Israel	
Italy	
Japan	
Korea, Republic of	
Netherlands	
Norway	
Portugal	
Russian Federation	
Saudi Arabia	
Slovenia	
South Africa	
Spain	
Sweden	
Switzerland	
Turkey	

United Kingdom	
United States of America	

TC 88 is, nowadays, composed by 5 working groups: (i) design requirements for offshore wind turbines (WG 3), (ii) assessment of wind resource, energy yield and site suitability input conditions for wind power plants (WG 15), (iii) measurement and assessment of power quality characteristics of grid connected wind turbines (WG 21), (iv) availability and reliability for wind turbines and wind turbine plants (WG 26) and (v) wind turbines – electrical simulation models for wind power generation (WG 27).

13 working groups and 8 maintenance teams also make up TC 88, as well as 5 joint working groups, which are: (i) wind turbines gearboxes linked to ISO/TC 60 (JWG 1)[42], (ii) communications for monitoring and control of wind power plants linked to TC 57 (JWG 25)[43], (iii) grid code compliance assessment for grid connection of wind and PV power plants managed by SC 8A (JWG 4), (iv) system issues regarding integration of wind and PV generation into bulk electrical grid managed by SC 8A (JWG 5)[44] and (v) photovoltaic off grid systems, including decentralized rural electrification and hybrid systems managed by TC 82 (JWG 1)[45].

TC 88 also has the AhG 1 – 'Terminology in the field of wind turbines', composed by 8 representatives of 6 national committees: Denmark (convenor and 2 members), Republic of Korea, Great Britain, Japan, Russian Federation and China.

TC 88 has, nowadays, 36 publications and 22 work programmes in progress. It is possible to mention as examples of international standards developed by TC 88, among others:

- IEC 61400-2:2013 – Wind turbines – part 2: Small wind turbines;
- IEC 61400-26-1:2019 Wind energy generation systems – Part 26-1: Availability for wind generation systems; and

[42] ISO/TC 60 – Gears
[43] TC 57 – Power systems management and associated information exchange.
[44] SC 8A – Grid Integration of Renewable Energy Generation.
[45] TC 82 – Solar photovoltaic energy systems.

- IEC 61400-1:2019 – Wind energy generation systems – Part 1: Design requirements

IEC 61400-26-1:2019 is available in English and in French for CHF 320, an amount equivalent to U$ 324. Its purpose is to provide standardized metrics that can be used to create and organize methods for availability calculation that can be applied to any number of wind generation systems whether represented by an individual turbine, a fleet of wind turbines, a wind power station or a portfolio of wind power stations. Its content is extremely technical and, besides mentioning some environmental specifications, it considers very limited different climate scenarios, such as calm winds, high winds, temperature too high, ice on blades and ice storm on grid.

Published six years before IEC 61400-26-1:2019, IEC 61400-2:2013, which addresses small wind turbines is available in English, French and Spanish for CHF 330, an amount equivalent to U$ 334. It deals with safety philosophy, quality assurance, and engineering integrity and specifies requirements for the safety of small wind turbines including design, installation, maintenance and operation under specified external conditions. During its review, various annexes were added, some of them considering wind conditions, tropical storms and extreme environmental conditions.

Indeed, it is possible to see that its content includes different climate factors such as extreme conditions, low temperature, ice, high temperature, marine (annex J), extreme wind conditions of tropical cyclones (annex K) and extreme wind direction changes (annex L). Although this suggests that such a variety allows the use of standards in countries with different climates and environmental conditions, the models shown in the figures attached to the standard relate to Sweden, Australia and Japan. On the other hand, it can be said that developing countries do not have extensive wind generation systems in which extreme situations could be recorded and illustrate the IEC 61400-2:2013.

IEC 61400-1:2019 will be object of a more detailed study. It has been published in February 2019 and it is available in English only, for CHF 350, an amount equivalent to U$ 354, in its basic version or for CHF 455, equivalent to U$ 460, in its redline version[46].

[46] The redline version indicates all the changes that were made, comparing the official standard and its previous edition.

The mentioned standard is said to provide minimum design requirements for wind turbines and not intended for use as a complete design specification or instruction manual. Its scope is to specify essential design requirements to ensure the structural integrity of wind turbines, providing an appropriate level of protection against damage during its planned lifetime. Therefore, it is concerned with all subsystems of wind turbines (control and protection functions, internal electrical systems, mechanical systems and support structures).

The current edition of IEC 61400-1:2019 constitutes a technical revision and includes significant technical changes compared to the previous one, such as the extension of wind turbine classes to allow for tropical cyclones and high turbulence as well as cold climate requirements.

Since its content is very specific to engineering and, therefore, evades the object of study of this research, in the legal field, the standard's topics will be briefly mentioned, focusing on those that appear to be more relevant to developing countries, *i.e.* technical aspects that may vary according to the countries' development conditions or to their climatic characteristics.

Having said that, the technical content of IEC 61400-1:2019 encompasses:

- Principal elements, such as design methods, safety classes quality assurance and wind turbine markings;
- External conditions, which will be latter detailed;
- Structural design;
- Control system;
- Mechanical system;
- Electrical system;
- Assessment of a wind turbine for site-specific conditions;
- Assembly, installation and erection;
- Commissioning, operation and maintenance;
- Cold climate; and
- Annexes related to the previous topics.

As previously mentioned, the standard outlines very specific technical requirements related to wind turbines design, mechanical and electrical systems, as well as their installation, operation and maintenance. Considering that the present research is limited to the field of international economic law, it is not possible to evaluate specifically how these technical requirements really affect developing countries, helping or preventing them to reach the desired expansion of renewable energy.

Similarly, it is not likely to assess how exactly these specific technical requirements favor or hinder international trade in terms of wind turbines and wind energy systems.

However, it is feasible to assay if a large variety of extreme conditions is properly considered in this document, so that the widest variety of countries, at different stages of development and with very different geographical and climatic conditions, can make use of the technical specifications contained therein.

In this sense, when it comes to the "External Conditions", IEC 61400-1:2019 addresses (i) wind turbine classes, (ii) wind conditions, which are classified as 'normal' or 'extreme', (iii) other environmental conditions, which are also considered as 'normal' or 'extreme' and (iv) electrical power network conditions.

The 'Assessment of a wind turbine for site-specific conditions' Chapter seems to be more detailed, since it considers, among other topics:

- Topographical complexity of the site and its effect on turbulence;
- Wind conditions required for assessment, considering wind condition parameters, measurement setup and data evaluation;
- Assessment other environmental conditions;
- Assessment of earthquake conditions;
- Assessment of electrical network conditions;
- Assessment of soil conditions; and
- Assessment of structural integrity by reference to wind data.

And specifically relating to extreme climate conditions, IEC 61400-1:2019 dedicates a Chapter to the cold climate, where it presents technical specifications related to:

- Low temperature and icing climate;
- External conditions for cold climate;
- Wind turbine class for cold climate;
- Structural design;
- Design situations and load cases;
- Selection of suitable materials;
- Control systems;
- Mechanical systems; and
- Electrical systems.

In its annexes, although, it is possible to find Annex J, entitled as ‘Prediction of the extreme wind speed of tropical cyclones by using Monte Carlo simulation method’, which considers prediction of tropical cyclone induced extreme wind speeds and prediction of extreme wind speed in mixed climate regions.

Annex M, otherwise, when dealing with ‘Medium wind turbines’ briefly mentions (i) external conditions, in which its included wind shear[47], (ii) assembly, installation and erection, (iii) commissioning, operation and maintenance and (iv) documentation.

It is important to note that Annexes J and M are considered simply informative for IEC 61400-1:2019’s purpose.

It is also remarkable that, although the content of the mentioned standard is very technical, it does not consider a wide range of scenarios. Indeed, wind and other environmental conditions are generically classified as ‘normal’ or ‘extreme’ and, even though the cold climate is object of a full Chapter, it is not possible to say the same about tropical weather, for example, since only tropical cyclones are mentioned in an informative Annex, which addresses a simulation method for prediction of them.

Therefore, IEC 61400-1:2019, as a very recent international standard with the purpose of providing design requirements for wind turbines construction, installation,

[47] variation in wind velocity occurring along a direction at right angles to the wind's direction and tending to exert a turning force.

operation and maintenance does not consider specific requirements for wind energy systems installed in locations with a wide variety of climates or geographical conditions.

And, in this sense, it is important to remind that developing countries are scattered around the world and face a wide variety of weather and geographical conditions. However, they often face challenges in logistics for production, transportation, installation and operation of equipment, as well as in compliance with the specifications in installation, operation and maintenance, and even in training of technicians for the proper use of equipment and its due care.

It is important to stress, though, that if developing countries were required to participate actively in the drafting of the standards, many of these issues could be overcome. The challenges to ensuring greater participation, as stated before, involve issues related to access to standards-setting organizations, as well as the costs involved with such participation, and even the availability of skilled technicians to participate in the discussions and to contribute effectively with them.

On the other hand, the greater participation of developing countries in the standard setting process will enable international standards to consider more distinct climatic and geographical conditions and possibly even the degree of technical development of such countries. This will certainly give not only greater legitimacy but also more effectiveness to these international standards.

It is feasible to say, though, that IEC has been working to change this scenario, as previously mentioned, through its Affiliate Country Program, as well by granting more affordable multiple users licenses, and by offering training through IEC Academy, providing webinars and providing free materials to participating developing countries.

4.5. THE LEGITIMACY OF INTERNATIONAL STANDARDS ON RENEWABLE ENERGY AND THE ACHIEVEMENT OF SDG 7

As previously mentioned, international standards may figure as barriers to international trade or as mechanisms of harmonization. Therefore, in terms of international

standards on renewable energies they can either prevent or promote the achievement of SDG 7.

In the first scenario, they can be used as protectionist measures, by establishing technical specifications that imply the use of certain equipment produced only by certain companies or as technological trapping instruments.

This is particularly complex if we consider that developing countries are usually highly dependent on foreign technology and they face more difficulties in developing their own technology in many sectors, such as in renewable energy and in energy efficiency.

On the other hand, when used as mechanisms of harmonization, international standards are able to foster technological deployment in the field of renewable energy, especially if they consider adequately the specificities of developing countries, such as geographical and climatic conditions, economic and technological development and human resources.

That is why certain aspects of legitimacy of international standards are notably relevant for this research. Indeed, ensuring engagement, transparency and access to the standard-setting process may allow developing countries to effectively participate and be considered in the international standardization process and, therefore, to assure that their interests are met.

Considering that the SDG 7 targets are specifically directed to developing countries and to ensure access to affordable, reliable, sustainable and modern energy for its citizens, ensuring the participation of developing countries in the process of international standard-setting is an indispensable step towards the full achievement of the SDG 7.

In this regard, it is important to note that some measures are already taken by ISO and IEC to increase the participation of developing countries in both the standard setting process and to broaden their access to already developed standards, as before mentioned.

However, other effective measures can be taken, such as:

- To consider the different stages of economic and technological development, so that the technical specifications conveyed in standards can be effectively used by developing countries;
- To take into account different geographical – such as electrification in isolated or rural areas – and climatic conditions which greatly affect developing countries for the deployment of coherent and applicable technical specifications;
- To promote greater dissemination of activities carried out by organizations, seeking to enhance the participation from representatives of developing countries, as well as non-governmental and civil society organizations, not just industry representatives;
- To reduce costs of participation in the standards development process. In this sense, IRENA (2013) recommends providing better funding for travel to attend meetings and the use of the latest communication technologies, allowing remote and virtual meetings and events;
- To foment further training in developing countries, so that its technicians can effectively contribute to discussions in the standard-setting procedures; and
- To ensure further reduction of access costs to published standards.

In this sense, international standards can, in fact, only contribute to the development of countries, to increase the access to energy as a whole and to renewable energy in particular, with the effective achievement of the SDG 7 if the standard-setting procedure really observes the elements of legitimacy highlighted here, namely: engagement, transparency and access.

CONCLUSION

In the context of the fragmentation of international law and the international standardization trend, with the increasing relevance of private actors in global governance and of international standards, this research focused on the relationship between international standards and the SDG 7 – 'Ensure access to affordable, sustainable and modern energy for all'.

Thus, the evolution of the concept of sustainable development in international law was briefly mentioned, in order to address the emergence of the 17 SDGs and the specific targets of SDG 7, considering energy as a vector of development, as well as its connection with SDG 17 – 'Partnerships for the goals', which calls private actors and civil society to contribute to the achievement of the SDGs.

The pursuit for international regulatory coherence and the vast doctrinal discussion about private governance and international standardization were objects of Chapter 3 of this essay, where the concepts used in this research were presented to the readers.

Legitimacy of international standards was also an object of the third Chapter, where it was possible to identify that three elements of legitimacy are particularly relevant for international standard setting procedures: engagement/ participation, transparency and accessibility, which guided this research.

Chapter 4 was especially devoted to study international standardization on energy, considering its role in renewable energy and the specific IEC procedures for the development of international standards on renewable energy. In that Chapter, practical examples were given, such as the IEC 61400-1:2019 – 'Wind energy generation systems – part 1: design requirements'.

The main purpose of this research was to investigate if the compliance with elements of plural participation and legitimacy, such as engagement, transparency and accessibility, in the process of international standards' issuance could contribute to the SDG 7 achievement and to the dissemination of renewable energies in developing countries.

It is possible to conclude, from the literature review and the various technical reports presented by relevant institutions that addressed this issue, that ensure greater participation of developing countries in the international standards-setting procedures is a very positive measure. Indeed, while it permits greater harmonization in private regulation and further dissemination of established standards, it also allows specific issues related to developing countries to be considered in the standard-setting process.

In this sense, several initiatives with a view to increase the legitimacy and the participation of developing countries in the standards-setting process were cited, such as (i) TBT's Code of Good Practice for the Preparation, Adoption and Application of Standards, (ii) ISEAL Code of Good Practice and Credibility Principles, (iii) ISO – DEVCO and (iv) IEC Affiliate Country Programme.

Nevertheless, the specific examples taken into consideration in this research demonstrate that, even though there are initiatives which aim greater legitimacy to the international standard-setting process and to ensure greater participation of developing countries, much remains to be done.

In fact, while ensuring greater participation and transparency to the international standard-setting procedures, as well as the access to them, are measures that can enable the achievement of SDG 7 targets, there are several obstacles for developing countries to effectively participate, contribute and adopt international standards, such as high costs and even the lack of skilled labor.

Briefly summarizing the findings of this research, international standards can contribute to the development of countries, to increase the access to energy and, specifically, to renewable energies, with the effective achievement of the SDG 7 only if the standard-setting procedures observes the elements of legitimacy studied herein: engagement, transparency and access.

Therefore, besides measures already taken by ISO and IEC to increase the participation of developing countries in both the standard setting process and to broaden their access to already developed standards, other effective measures are proposed in this research, such as the following ones:

- To consider the different stages of economic and technological development, so that the technical specifications conveyed in standards can be effectively used by developing countries;
- To take into account different geographical – such as electrification in isolated or rural areas – and climatic conditions which greatly affect developing countries for the deployment of coherent and applicable technical specifications;
- To promote greater dissemination of activities carried out by organizations, seeking to enhance the participation from representatives of developing countries, as well as non-governmental and civil society organizations, not just industry representatives;
- To reduce costs of participation in the standards development process. In this sense, IRENA (2013) recommends providing better funding for travel to attend meetings and the use of the latest communication technologies, allowing remote and virtual meetings and events;
- To foment further training in developing countries, so that its technicians can effectively contribute to discussions in the standard-setting procedures; and
- To ensure further reduction of access costs to published standards.

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