Energy Efficiency Standards:
The Struggle for Legitimacy

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ABSTRACT

The decrease in the regulative power of states has generated a governance gap that has been filled by, among others, international standard-setting bodies. In these bodies, private technical experts shape the rules that govern commonly used technologies as well as influence various societal outcomes. The legitimacy of such regulatory outsourcing is largely based on a variety of quasi-democratic mechanisms and principles, which these bodies have endeavored to make central to the standard-setting processes. This paper examines these legitimacy-seeking aspirations by comparing the normative claims with the actual practice of developing the international technology standard for TVs by the International Electrotechnical Commission, based on interviews with stakeholders and numerous public and internal documents. The findings suggest that the process is inadequate if the goal is not just to bundle technical expertise but also to meet the standards of democratic governance. The study thus contributes to the literature on standard-setting and legitimacy beyond the nation-state.

KEYWORDS

Energy Efficiency, IEC 62087, International Electrotechnical Commission, Labeling Regulation, Private Governance, Television, Transnational Governance

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INTRODUCTION

Globalization is associated with a decrease in states’ regulative power and a growing influence of transnational and private rule-makers. Private actors are increasingly called upon to leverage their resources to shape numerous public policies (Büthe & Mattli, 2011), including health and safety, carbon emissions, and biofuels. They do this by developing and promoting explicit norms – such as international standards written by International Standard-Setting Bodies (ISSBs) – that regulate ‘governance gaps’ (Nolan & van Heerden, 2016) left unregulated by governments. Indeed, despite being nominally voluntary, international standards are often transformed into requirements that penetrate public law as well as produce strong distributional effects among stakeholders. Moreover, the World Trade Organization (WTO) is exercising a high level of deference towards such standards, expecting their use as benchmarks for various domestic technical regulations¹ (Delimatsis, 2014).

Such regulatory outsourcing is subject to legitimacy requirements similar to those to which public regulators are subjected (Zürn, 2004); scholars have expressed concerns, though, that ISSBs’ procedures are driven by technocratic decision-making instead ² (Cafaggi, 2011) and that their standard-setting practices are in tension with core principles of democracy, causing a legitimacy deficiency in global governance (for a recent extensive study, see Eliantonio & Cauffman, 2020). Against this backdrop, numerous guidelines have been established to create procedural safeguards for private rule-making legitimacy and for “good standardization.” Two key examples are the WTO Code of Good Practice (COGP) and the guideline for recommended practices for standardization ISO/IEC Guide 59:2019. However, it has only rarely been examined to what extent and how such guidelines are implemented in practice (see, for example, Kanevskia, 2020).

This paper focuses on energy efficiency labeling for Televisions, which is a paradigmatic case, where a privately developed international standard plays a central role in the functionality of government regulations to reduce our energy bill and environmental footprint as well as create market incentives for manufactures to design more energy-efficient appliances (Sanchez et al., 2008). In such regulatory schemes, examining the legitimacy of the embedded international standard is warranted. At stake are not just procedural aspects of governance but also the effectiveness of such an instrument to resolve the intended regulatory challenge. As the guidelines referred to above aim to address, inter alia, such concerns, this paper asks how legitimate the process of setting the international standard for TVs is with respect to the principles of good standardization?

To answer this question, the process of developing the IEC 62087 will be analyzed against the procedural and substantive requirements of good standardization articulated in the COGP and the ISO/IEC Guide 59. The guidelines are considered rooted in the normative principles of democratic legitimacy – input, throughput and output – and collectively comprise an overarching framework that international standard-setting should adhere to in order to achieve legitimacy.
IEC 62087 – developed by Technical Committee 100 (TC100) at the International Electrotechnical Commission (IEC) – proves to be an interesting object of study since it not only governs a globally used technology but also was integrated into regulations that were widely applied and have far-reaching societal consequences. To the author’s knowledge, only a handful of papers have conducted a similar analysis, and this paper is the first to shed light on why such a techno-policy standard may fail to achieve its stated objectives (i.e., lacks output legitimacy). Since the standard was adopted, it has repeatedly been criticized for being ill-suited to achieve its objectives, causing a rise in the amount of energy consumed by TVs on both sides of the Atlantic.

The author argues that the standard-setting practices in developing the IEC 62087 are inadequate if the goal is not just to bundle technical expertise but also meet the standards of democratic governance in filling the current governance gap. The paper seeks to supplement a shortage of relevant empirical studies in the literature on governance without governments and hence contributes to this stream of research by fostering our understanding of the potential legitimacy of private governance.

The remainder of the paper is organized as follows. The next section introduces the normative approach to legitimacy and identifies key procedural principles and substantive guarantees that legitimize ISSBs’ procedures. These components serve the purpose to analyze the legitimacy of the IEC 62087 development process. In the methods section, the methodology and the data used are introduced. This is followed by background information about the case. The subsequent section provides a concise analysis of the IEC 62087 development process using the legitimacy criteria developed in the theory section. The last section concludes by arguing that this research’s findings call into question the legitimacy of the standards developed by the IEC.

THEORETICAL FRAMEWORK

Legitimacy has been defined as ‘a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions’ (Suchman, 1995, p. 574). In the realm of rule-making beyond states, whereby legitimacy cannot be derived through traditional democratic sources, the concept is multidimensional and contains significant ambiguity. One of the main sources of normative legitimacy for ISSBs is the implementation of quasi-democratic mechanisms in their structures and decision-making processes (Cafaggi, 2014). While relevant literature has told us much about what these mechanisms might entail, little has been said about how do they work in practice.

In the realm of international trade, international standards gain their legal effect by respecting six procedural and substantive guarantees required by the WTO: transparency, openness, impartiality and consensus, effectiveness and relevance, coherence, and to address the concerns of developing countries. Additionally, major ISSBs have developed internal codes of conduct to ensure adherence to such principles. For instance, the International Standardization Organization (ISO) and IEC developed
the ISO/IEC Guide 59 that requires the implementation of six principles in their internal processes: inclusiveness, consensus-building attitude and skills, compliance with the procedures, efficiency, impartiality, commitment to quality and dedication of personnel and experts. In principle, such guidelines offer control measures to address the democratic deficits in such expertise-driven governance and ultimately lead to “good standardization.” A close examination of these guidelines shows that they are rooted in the democratic principles for legitimating non-state regulatory regimes identified by the literature. Scholars studying these principles debated the criteria that should be used when evaluating the normative legitimacy of international standard-setting processes. Most of their research builds on the work of Scharpf (1999) and Schmidt (2013), which distinguishes between input, throughput and output legitimacy. This paper considers the requirements in both guidelines – ISO/IEC Guide 59 and COGP – as inherent in the three dimensions of legitimacy and that they collectively comprise an overarching framework that international standard-setting should adhere to in order to achieve legitimacy. To make such kind of a framework empirically tractable, its concepts and their operationalization require more discussion.

Input legitimacy concerns allowing for equal representation of all interests at stake (Senden, 2020, p. 27). This enhances the rationality of the process (Scherer & Palazzo, 2007), as well as the substantive accuracy of international standards (Glinski & Rott, 2020). Requirements from the ISO/IEC Guide 59 and COGP, such as openness, inclusiveness, and addressing the concerns of developing countries, are meant to enhance input legitimacy. Empirical analyses highlight that input legitimacy is far from already having been fully achieved. Relevant studies show an overrepresentation of developed countries and an underrepresentation of stakeholders representing non-commercial interests as well as women in international standard-setting (see, for example, Forsberg, 2012).

Throughput legitimacy emphasizes that the range of involved preferences are given serious consideration, as well as the rule-makers are held accountable towards all stakeholders (Bäckstrand, 2010). While the governance literature is often unclear about what throughput legitimacy entails (for an extensive review, see Steffek, 2019), transparency is regarded as an essential enabling factor. This requires the public – and other stakeholders – to have access to information and decision-making procedures, as well as oversight mechanisms that enable them to evaluate the performance of the institution (Bekkers & Edwards, 2011). Requirements from the ISO/IEC Guide 59 and COGP such as transparency, consensus, impartiality – and to a less extent – coherence, compliance with the procedures, building attitude and skills, commitment to quality and dedication of personnel can enhance throughput legitimacy. Faure and Philipsen (2020) showed that if international standards are formulated in an atmosphere of secrecy behind the veil of professionalism and confidentiality without transparency or accountability or public participation, they are more likely to serve the dominating stakeholders’ interests.

Output legitimacy, in turn, concerns the evaluation of the effectiveness of regulations in promoting common welfare, especially in fulfilling the economical and
policy objectives (Bäckstrand, 2010). Requirements from the ISO/IEC Guide 59 and COGP, such as effectiveness and relevance can enhance this dimension. Studies on the legitimacy of international standard-setting have mostly refrained from empirically assessing the extent to which specific outputs (i.e., particular standards) meet this criterion. This has been attributed to: (1) the complexity of identifying a precise objective for the assessed standard; (2) variable implementation time, which makes it difficult to evaluate the impact of the standard (Hahn & Weidtmann, 2010). Indeed, it has been argued that evaluating problem-solving effectiveness is a complex exercise influenced by timing, measurement, and most of all who is judging (de Bakker et al., 2019, p. 366). The IEC 62087 has to date been in use for two decades, and its efficacy has been independently validated and perceived by a number of expert reports and studies. The following analysis of the output legitimacy of IEC 62087 builds on these evaluations.

Mena and Palazzo (2012) operationalized the legitimacy dimensions to assess governance bodies exercising a regulatory power. They define four criteria for assessing input legitimacy (inclusion, procedural fairness, consensual orientation, and transparency) and three to assess output legitimacy (efficacy, coverage and enforcement). This article builds on their operationalization for the analysis of the IEC 62087 setting process, as it covers the main democratic principles that have been identified in the literature as well as the requirements of ISO/IEC Guide 59 and COGP as conditions for a governance process to be considered legitimate. Despite not being classified as a separate criterion for assessing legitimacy, throughput legitimacy is inherent in the operationalization framework. Following Schmidt and Wood (2019) and DeMenno and Büthe (forthcoming), the author views it as being covered by the aspects of procedural fairness, consensual and transparency.

According to their operationalization, the chances for a process to achieve high input legitimacy are strong if all relevant stakeholders participate (inclusion) and are considered equal partners in the decision-making process (procedural fairness). Regarding the throughput dimension, chances for a process to achieve high legitimacy is strong if the elaboration of a standard, the voting procedures, or the repartition of power, are disclosed (transparency) and stakeholders are able to change their positions in a given discussion on the basis of convincing reasons (deliberative and consensual orientation). Finally, high output legitimacy can be achieved if the number of stakeholders implementing the standards is high (coverage), problem-solving effectiveness of the process output is high (efficacy), and the ISSB ensures that their rules are followed and applied in practice (enforcement). Due to the difficulty in counting all the manufacturers that have implemented the standard, coverage is considered relatively less helpful in evaluating the legitimacy of IEC 62087.

Other scholars have applied legitimacy assessment models to different standard-setting processes, such as corporate social responsibility and nanotechnologies (Eliantonio & Cauffman, 2020; Forsberg, 2012; Hahn & Weidtmann, 2016). Most of them conclude that ISSBs need further refinement in terms of inputs and throughput legitimacy – such as inclusiveness, transparency and accountability – to be legitimate.
mechanisms for setting global rules. Similar legitimacy deficiencies may be found in the process of setting IEC 62087 (i.e., low input and throughput legitimacy). Meanwhile, none of this work has studied how legitimate standards are in terms of achieving the stated regulatory objectives (i.e., output legitimacy). This becomes more prominent since ISSBs are increasingly counterbalancing the deficiency in input legitimacy with output legitimacy (Werle & Iversen, 2006). This paper seeks to fill this gap in the literature as well as show the extent to which previous findings can be present in an institution that governs – in the shadow of governments – commonly used electrical appliances. Moreover, the paper will show how deficiencies in the legitimacy of a techno-policy standard can ultimately contribute to a failure to safeguard certain stakeholders’ interests.

**METHOD**

The paper employs qualitative methods to collect and analyze its empirical data with an ambition to provide breadth and depth of understanding of a single case (Yin, 2014). Data were derived from: (1) fifty-nine internal IEC documents comprised of different drafts of the IEC 62087, compilations of participants’ comments and results of ballots. Analyzing these documents allowed the author to track the development of the standard as well as identify the actors who submitted most of the comments on the different drafts and hence shaped the IEC 62087; (2) dozens of public documents related to the development of the labeling policies in the US and EU such as documents related to the ENERGYSTAR program developed by US Department of Energy, and environmental agencies’ reports, verification studies and other documents related to the development of the European labeling policy; (3) the author conducted semi-structured interviews with the actors who have been identified through the analysis of the documents. Additional interview subjects were interviewed because they have specific experience in the field (e.g., performing energy testing, or developing standards for TVs); see Appendix for details.

Interview questions were generally focused on: how the participants of developing the IEC 62087 have formed their respective national positions at the IEC and what interests have they represented; how the energy measurement procedure was designed; how the participants coordinate with their domestic standardization body; how the principles of “good standardization” are implemented throw-out the process.

As developing the standard followed typical IEC procedures, lessons from the study will allow the reader to reflect broadly on how such procedures are executed in practice. By and large, the study seeks to reveal what can be learned from both tracking a specific standard-setting process and the experiences and observations of the developers/stakeholders.
BACKGROUND

In the early 2000s, the TV industry attracted considerable attention because the advanced, ever-larger then-new Plasma and Liquid Crystal Flat Displays (LCD), as well as the increase in connected devices resulted in a substantial increase in electricity demand (Crosbie, 2008). In response, several policy efforts in the US and the EU attempted to limit that increase in energy consumption.

Setting the Standard

A foundational component of energy efficiency policies is a measurement procedure that reasonably estimates the energy consumption of the electrical products being regulated. Such a procedure needs to specify, among other elements, the conditions for taking such measurement, so that the results will reflect energy consumption under different real-life use conditions. For TVs, there was a need to adopt an energy measurement procedure to act as a basis for estimating the energy efficiency level that would eventually appear on a label affixed on the outer packaging. The procedure was, therefore, crucial, not only for the implementation of the regulation but also for TV companies that are concerned about how efficient their TVs will appear to consumers. Indeed, energy labels have been recognized as an effective instrument in helping consumers to compare the energy efficiency of appliances on an equitable basis (Stadelmann & Schubert, 2018). Bearing an energy label highlights the TV’s energy efficiency, which leads to an increase in sales (Northwest Energy Efficiency Alliance, 2011).

Around the year 2005, three standards existed for measuring TVs’ energy consumption, with different technical approaches: the U.S. Department of Energy measurement procedure; a procedure developed by the Japan Electronics and Information Technology Industries Association; and the first version of the IEC 62087 that was developed by the IEC in 2002. The industry tested the consequences of applying the existing energy consumption measurement procedures to their newly developed displays. Based on their testing results, the leading actors from both dominating technologies (Plasma and LCD) argued that the three procedures are applicable only for the old bulky cathode ray tube TVs and that they all failed to control for an essential element, later called the Average Picture Level (APL)\(^5\). They claimed that this failure caused an exaggeration in the energy amounts measured (Stobbe, 2007). In other words, they believed that their displays consumed less energy than what the testing results showed. This created a deep concern for the industry, especially for manufacturers producing Plasma displays\(^6\). By that time, APL as a notion was almost unknown, with no available way for measuring it. The display manufacturers offered to help regulators from the US and EU develop a new measurement procedure that would overcome the deficiencies present in the existing standards. It was agreed to develop the new procedure within the IEC framework and include it in the subsequent version of the IEC 62087 (Stobbe, 2007, p. 22).
Due to different technical reasons, the APL played a greater role in determining the amount of energy consumed by Plasma technology (Jones et al., 2007) – the effect was less for LCD. Plasma sponsors’ fear of the APL issue was reflected in the substantial amount of work done by the main Plasma promoter, Larry Weber. With the help of other market players, Weber found a way to measure the APL and even estimated a global average level. In addition to developing this fundamental component, he edited the procedure’s main testing component, namely a 10-minute dynamic broadcast-content video signal. It was claimed that the video contains a variety of TV fragments that emulate what people typically watch on their TVs and imitate the average APL level (LCD TV Association, 2008).

The resulting measurement procedure was an essential element of IEC 62087:2008. In simple words, a meter will record the energy consumed by TVs while a video is playing, with all settings set to default (i.e., manufacturer-recommended or out-of-the-box settings). The industry advocated that the test be performed based on manufacturer-recommended settings (Fairhurst, 2009), later called “Home Mode.” While this was not a definite requirement in the standard, the labeling regulations explicitly required it. Performing the test while the TV is on default settings was based on the assumption that consumers never change the default settings of their TVs.

Developing the Labeling Regulations

IEC 62087:2008 and its three subsequent versions: 2008, 2011 and 2015, were integrated in TVs’ energy labeling program in the United States (versions 4.0, 5.0, 6.0, 7.0 and 8.0 of the ENERGYSTAR specifications); and the EU regulations (EC/642/2009, no. 801/2013, (EU) 2016/2282, no. 518/2014 and (EU) 2017/254). In the US, in order for a TV to bear an ENERGYSTAR label, the energy consumed – measured according to the testing procedure included in IEC 62087 – should fall below a certain threshold. Major TV manufactures were greatly involved in developing the specifications for the program. In the EU, the Commission adopted another approach, whereby an energy efficiency rating is estimated for a given TV – based on performing the energy measurement method included in the IEC 62087 – then displayed on the label. The EU Commission conducted several preparatory studies based on market data provided by the industry and discussed drafts of the regulation with stakeholders within consultation forums (their considerable involvement can be seen in Stobbe, 2007).

Introducing the IEC

In the century since it was established, the IEC has become one of the most important technical rule-makers for the global economy as a standard-setter for millions of electronic devices used around the world (Büthe, 2010). The IEC consists basically of its’ members, executive and advisory bodies and internal officers. Countries interested in participating in the IEC need to have an established National Electrotechnical Committee (NEC), which upon admission, is called the National Committee (NC) of the respective country. Only one NC can participate per country, and it should be
representative of all the interests of the respective national stakeholders regardless of their actual affiliation. The IEC requires participating NCs to submit comments and votes in a consolidated position about emerging standards (IEC, 2001). In principle, domestic standardization bodies establish national mirror committees comprised of national stakeholders, who coordinate with the respective NC to form a consolidated national position at the international level (i.e., the aggregation principle, which is a major source of input legitimacy for the IEC standard-setting process).

Developing a new, or revising an existing, standard is carried out within groups of NCs – interested in standardizing a given electrotechnical area – under the overarching Technical Committee (TC) umbrella. The different versions of the IEC 62087 were developed within the framework of the Technical Committee 100 (TC 100). NCs can participate as “P” members, who tend to take a proactive role by attending meetings and voting, or “O” members whereby they are allowed to attend certain meetings as observers with no voting rights. A broader range of stakeholders – such as environmental and consumer associations – can also participate as liaison members. Organizations representing citizens and environmentalists’ interests in ISSBs – such as the European Association for the Co-ordination of Consumer Representation in Standardization (ANEC) and the European Environmental Citizen’s Organization for Standardization (ECOS) – can take part in the IEC work as ‘Category A Liaison’; a non-voting membership that allows them to attend certain meetings.

SETTING IEC 62087 AND THE LEGITIMACY CHALLENGES THEREOF

Based on the framework introduced above, this section undertakes a detailed legitimacy analysis for the process of setting IEC 62087. Specifically, the analysis is structured along the three dimensions of legitimacy by focusing on the criteria of inclusion and procedural fairness (comprising input legitimacy), transparency and consensual orientation (comprising throughput legitimacy), coverage, enforcement and efficacy (comprising output legitimacy). Requirements in ISO/IEC Guide 59 and COGP are considered inherent in these three dimensions and criteria.

Inclusion and Process Fairness (Comprising Input Legitimacy)

IEC internal documents show that the TC100 comprises 30 NCs, who submitted a total of 471 comments. Seven P members only – representing industry-leading players and developed countries – provided all the comments. One of these NCs submitted around 50%, another two jointly submitted 40% of the total comments. Apart from the seven, no other NCs submitted any comments. When the author asked about the reason behind this distribution of voting, interview subjects suggested that expertise plays an important role; and in fact, this is not unusual. For example, one interviewee responded: “from my several years of experience, a small number of people do most of the work in a given TC. The ones with expertise; the rest basically decide if they can live with the content” (Interview Subject no. 4).
Moreover, ANEC and ECOS were neither involved nor consulted in developing the standard. Several interviewees confirmed this absence of consumer and environmental representatives and interests. For example, one interview subject said: “Government was involved but not TV users. Consumers associations are usually worried about risky products but not TVs” (Interview Subject no. 2). Evidence suggests that a lack of funds is preventing such bodies from being present at the meeting. A former ANEC employee confirmed that: “We have experts, and I believe that if we could sit at the table, the industry would listen to us; unfortunately, we don’t have enough funds to participate in the meetings” (Interview Subject no. 11).

All this suggests that several major (technical) assumptions regarding how TVs are typically used – importantly, such as the assumption that consumers never change default TVs’ settings – were made without (sufficient) consultation with consumers. Similarly, the ‘representative’ APL level was estimated without consulting consumer associations or testing labs and based on data collected from a small number of countries. The author is concerned here about the interest served when the actors from Plasma technology dominated the processes of measuring, as well as estimating the global level of the APL. As the Plasma sponsors were relatively more concerned about the measurement method, delegating the task of estimating an international APL level to them – with no consultations with consumer associations – increased the risk of biasing the data.

The industry is also able to increase its influence, when needed, in a given TC by ‘activating’ NCs to effectively increase their voting power. When the author asked about the interests represented in developing the IEC 62087, two interview subjects – who participate in several TCs – reported: “I try to convince my national mirror committee that the position of my sponsor will be best for the country. If I fail in doing that, my sponsor will most probably ‘activate’ additional NCs to support our position” (Interview Subject no. 10); Interview Subject no. 3 said, “Companies increase their influence, whenever needed, by increasing their voices in a given TC.”

Moreover, evidence points to insufficient implementation of the aggregation principle. In setting IEC 62087:2008, there is a lack of coordination between NCs and respective national mirror committees. Responses from interview subjects confirmed that NCs primarily consulted their employers – in this case, manufacturers – in the process of forming their positions regarding different aspects of the IEC 62087. Several interview subjects confirmed the finding: “I consult my company, as they are the ones paying me, you know” (Interview Subject no. 5); “In setting the IEC 62087:2008, NCs were not able to consolidate inputs from mirror committees. For me, I consulted my manufacturer first” (Interview Subject no. 3); “NCs’ inputs usually reflect manufacturers’ opinions and/or their own expertise. In fact, mirror committees usually consist of manufacturers only” (Interview Subject no. 4); “I need to balance between three interests: of the manufacturer I’m presenting, the national interest, and the IEC interest. I prioritize my sponsor interest; it’s an industry-driven organization” (Interview Subject no. 10). The same interviewee added: “Members representing governments face issues in organizing their voice in a consolidated position, mainly
due to bureaucracy and weak coordination with the industry. It is not the IEC’s job anyway to ensure balanced representation at the national level, it is the responsibility of the NCs”; “We do our best to ensure a balanced representation of interest in the national mirror committee; however, in this case it was only the industry” (Interview Subject no. 9). Additionally, the author had the chance to review the composition of one of the NCs that submitted a substantial amount of the comments11. There was no presence of consumer associations or environmentalists – the committee consisted of five producers and suppliers.

Concerning public access, the main relevant tool introduced by the IEC to obtain public comments through their website proved to be ineffective. Indeed, one of the interview subjects – who has access to performance data of this tool – said that the public commenting tool introduced a number of years ago on their website has registered a few records only (Interview Subject no. 9). The public has no other way than this tool to participate in developing IEC standards.

In summary, the process was dominated – and hence the IEC 62087 was shaped – by a very small number of male industry representatives coming from developed countries. Consumer and environmental groups, as well as women, were absent. The process lacks an effective mechanism for public participation and does not provide all stakeholder groups with equal chances for obtaining voting rights. The financial and technical capabilities of a given stakeholder play a major role in gaining such a key right. All this undermines the input legitimacy of the process.

**Transparency and Consensual Orientation (Comprising Throughput Legitimacy)**

Access to IEC meetings or documents is restricted to members. In fact, access varies, even amongst members of a given TC. For instance, NCs with O membership cannot access all technical documents and meetings. For research purposes, the author was able to access an internal IEC portal where – according to the IEC – all available documents related to developing the IEC 62087 were posted. In this regard, several findings should be highlighted.

First, important documents – such as minutes of (technical) meetings – were not available in the portal or even did not exist. Evidence from the interviews points to ‘informal avenues’ of decision-making: “At TC100 we resolve conflicts (if any) based on technical negotiations. We try to avoid conflicts at the voting stage” (Interview Subject no. 3); another interviewee responded when the author asked about how agreements on different issues are achieved: “Most of the agreements are concluded during coffee breaks” (Interview Subject no. 4). This suggests that technical agreements are reached, and potential conflicts are resolved without (sufficient) documentation. For example, in order to develop and estimate the ‘global’ APL that reflects what consumers experience while watching TVs in real-life, TC100 had to rely on scientific data and expert opinion provided by certain participants (Interview Subject no. 1). The author failed to find any related documentation, even after asking several TC100 participants for them. The same applies to the assumption that consumers do not change
their TVs’ default setting – which had a considerable effect on how the measurement procedure should be designed. Many of the documents accessed by the author were merely summaries and drafts of the IEC 62087, showing almost no details about the rationale/data behind the (technical) decisions made.

Moreover, the author failed to find any documentation related to how the experts were identified and nominated to get involved in the work. External experts – invited by the TC100 – can perform their own studies and provide non-binding opinions, which are thoroughly discussed in sub-committees (also known as working groups). These sub-committees have stricter rules in terms of obtaining access to them – for example, O members cannot attend their meetings. Given that these participants are sponsored (in many cases employed) by their market players, transparency becomes quite decisive here if the experts’ neutrality is to be achieved. The same applies to TC100 participants themselves: relevant details such as names and affiliations of some participants were not available. The author had to obtain such information from interview subjects and through researching the TC100.

In the case of IEC 62087, stakeholders representing interests other than the commercial stakeholders were almost entirely absent; hence, consensus had to be achieved among the participating manufacturers only. In fact, due to lack of documentation, there was no way to review how opposition (if any) among the participants was resolved – despite the existence of No votes in the ballots. Moreover, some NCs have rules that oblige their representatives to vote Yes by default, unless there are specific counterarguments, even when the mirror committee lacks the expertise to assess the proposal adequately. Standards, therefore, appear to be more thoroughly validated than they really are. Interview subjects confirmed this practice; for example: “Every NC has its’ own rules for voting. Generally, if they can live with the content, there is no reason not to vote Yes” (Interview Subject no. 4).

In summary, the closed-door-policy for conducting meetings and lack of documentation inhibits transparency and traceability in particular for stakeholders who are not directly involved in the process. Much important information and many documents are not disclosed even for in-depth research purposes such as this work. This made it difficult to analyze how agreements were reached, and disagreements were resolved (if any), in developing the standard. Consequently, throughput legitimacy is undermined.

Efficacy, Coverage and Enforcement (Comprising Output Legitimacy)

Several recent testing and market studies have found that the aspired objectives of developing the standard were not (sufficiently) achieved. This has been repeatedly suggested – for different versions of the standard – by a number of related studies and expert reports (Hall, 2017; Neslen, 2016; Tinetti et al., 2015). Achieving the energy labeling objective depends upon the meaningfulness of the information shown to the consumer (Stadelmann & Schubert, 2018). Yet, many studies have found that the energy consumption amounts indicated on the labels overestimate the TVs’ efficiency in the US and EU. Verification tests and expert opinions below show that the energy
measurement procedure was applied under unrealistic testing conditions, causing TVs to – appear to – consume less energy.

One common problem is that most TVs ‘out of the box’ settings leave consumers not satisfied with the brightness of their screens when first turned on. Most consumers, therefore, modify the settings – increasing luminance and thus energy consumption to achieve a better picture (DECO Proteste, 2015; for example, Taub, 2009). This suggests that manufacturer-recommended settings repeatedly failed to reflect real-life use conditions – at least with regards to luminance level – and were unrealistically low. Evidence from the author’s discussion with the Portuguese consumer association, which conducted one of the testing studies, confirms this: “Unfortunately, through our tests, done in 2014, we found a disturbing discovery. In many devices, in order to achieve a good energy label – more appealing to the consumer – manufacturers have begun to offer poor image quality with the default settings. On many TVs, the images are even darker and have less contrast than desired” (Interview Subject no. 12). Moreover, verification tests suggested that changing default settings causes a substantial increase in the power consumption – up to 50% beyond the value declared on the label (Michel et al., 2013; Stiftung-Warentest, 2011).

The discrepancy was even described as a loophole in the labeling regulations by ANEC and the Bureau Européen des Unions de Consommateurs in their comments on the 2012 discussion paper presented by the Commission (Malizou, 2015). A loophole in the sense that manufacturers lowered their default settings to achieve a higher energy efficiency label, taking advantage of the fluid requirements in both the IEC 62087 and the labeling regulations. Evidence from the interviews suggests that testing experts would have a different approach if they were present during the standard-setting: “If I were there, I would have sat the TV to average using conditions and then applied the test. We normally inform the IEC when we find the testing procedure unrealistic” (Interview Subject no. 11). Meanwhile, consumer reports and verification studies continued to suggest, among other things, that testing conditions are not representative of real-life use conditions (see, for example, Baton et al., 2017; Willcox, 2015). A study by the Natural Resources Defense Council estimated the value of the unpredicted energy consumed by TVs at $1.2 billion in the United States alone (Horowitz & Remick, 2016). In the EU, the regulation was amended in 2016 because the verification tolerances laid down in the implementing measures were exploited by some manufacturers to achieve higher energy efficiency ratings (EU Commission, 2016).

Finally, developing the standard took several years. Consequently, by the time it was developed, the standard was outdated, as a result of the technological development. Indeed, TV technology developed faster than anticipated by the regulators in the EU and the United States (Howard et al., 2012). Evidence suggests that this was partly due to the industry providing outdated data as part of their inputs to help design the labeling regulations. In the EU, the predictions made by the preparatory study – in terms of the market status and technology progress – were far from what later materialized (Centre for Strategy and Evaluation Services and Oxford Research, 2011). In fact,
the majority of TVs met the requirements before the labeling regulation even entered into force (EU Commission, 2012; Michel et al., 2014). Critics suggested that the standard and/or related regulations were based on manufacturers’ preferences, which helped them achieve exaggerated energy efficiency (Huulgaard & Remmen, 2012). All this resulted in hindering the regulations’ ultimate positive impact (Christensen et al., 2019).

Determining the exact number of adopters of IEC 62087 would be too time-consuming. It would also not be a meaningful metric: While the implementation of the IEC 62087 per se is voluntary and not legally binding, adherence to the overarching labeling regulations – and hence adopting the standard – is inevitable for TV manufacturers if they want to access the American and European markets. The standard, therefore, was indeed adopted by many TV manufacturers and, in that sense, has high coverage, but this observation is not indicative of high output legitimacy.

Regarding enforcement, for the vast majority of its standards, the IEC does not monitor implementation (Büthe, 2010). In this case, the task was left to different public and market verification/testing authorities. Additionally, it is not clear how non-compliance would be sanctioned. IEC 62087, therefore, can be characterized as having low enforcement.

As noted above, the standard has been repeatedly evaluated for its effectiveness in accurately measure the energy consumed by TVs – at different points of time and by a number of experts and verification studies. All of this work points to deficiencies in fulfilling the standard’s objectives, further undermining the output legitimacy of the standard.

**CONCLUSION**

This paper has examined the legitimacy-seeking aspirations of the IEC 62087 by comparing the normative claims of good standardization with the actual practices of developing the standard. By and large, the analysis shows that the process of developing the IEC 62087 is inadequate if the goal is not just to bundle technical expertise but also meet the standards of democratic governance in filling various governance gaps at the interface of technology and society. This deficiency has ultimately contributed to a failure to safeguard the interests of consumers and environmentalists. Additionally, the findings suggest that similar legitimacy assessments should cover all three dimensions of legitimacy without a greater focus on output legitimacy —as suggested by (Werle & Iversen, 2006). Yet, the author believes that IEC can contribute positively to the governance of commonly used (electrical) technologies if the raised challenges are addressed more effectively.

First, while the perfect representation of all stakeholders may be an unrealistic goal and might negatively affect throughput legitimacy (Hahn & Weidtmann, 2016, p. 107), the analysis of this case suggest a significant unbalanced representation of interests, resulting in a bias in the distribution of power among the stakeholders. A small number of male actors representing developed countries and associated with
commercial interests dominated the process. At the same time, actors representing non-commercial interests and developing countries were almost absent. None of the participants in developing the standard, at any stage, was a female. This considerably undermines the input legitimacy of the process.

Second, while the scientific basis on which the IEC 62087 ought to be built should improve the legitimacy of the development process, insufficient transparency regarding the formation of such a scientific basis ultimately undermines throughput legitimacy. Less involved stakeholders were unable to evaluate the activities of the IEC, and hence cannot assess whether their preferences were respected. In this way, the ability to participate and influence the process is distributed unequally amongst stakeholders representing different interests and countries. In fact, the lack of transparency does not allow for a verification of how some normative claims are implemented in practice, such as consensual orientation. All this further hinders the accountability of the IEC, as an organization, as well as the actors involved.

Finally, many expert reports and verification studies have criticized the ability of the standard, and ultimately the labeling regulations, to fulfill the regulatory objectives. The unexpected increase in the amount of energy consumed by TVs caused a rise in both consumer energy bills and (potentially) the respective environmental footprint. This has been – at least partly – caused by making inaccurate assumptions about how users watch TVs. Output legitimacy has been further undermined by the IEC’s incapability to ensure proper compliance with the standard. Indeed, despite the many complaints raised by consumer and environmental associations about the fluidity of the standard, no corrective actions were taken by the IEC – such as sanctions or a change in their internal procedures to remedy the issue – beyond amending the standard.

These findings raise additional questions over the clear lines of accountability, the participation of non-commercial stakeholders, and roots of decision-making in international standard-setting processes. For example, how to enhance the transparency of the process while maintaining sufficient confidentiality for the technical work.
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**ENDNOTES**

1. Article 2.4 of the Technical Barriers to Trade agreement.
2. Legitimacy is driven by participatory commitment, mutual monitoring and general consensus.
3. The author is grateful to the IEC for making the documents available.
4. The author wanted to include more interview subjects from civil society organisations such as the European Association for the Co-ordination of Consumer Representation in Standardization (ANEC) and the European Environmental Citizen’s Organisation for Standardization (ECOS). However, they ignored/rejected several invitations for an interview.
5. The APL is a measure of the luminance content of the television signal. In simple terms, it equals 0% when the screen is totally black and increases with brighter signals to reach 100% when the screen is totally white.
6. This can be seen in letters submitted to the Environmental Protective Energy (EPA) by Dr. Larry Weber, who is considered the father of the Plasma technology [https://www.energystar.gov/index.cfm?c=archives.tv_vcr_spec](https://www.energystar.gov/index.cfm?c=archives.tv_vcr_spec)
7. The average was estimated based on data collected from the United States, the United Kingdom, Australia, the Netherlands and Japan.
TVs typically have several present modes. Each mode has certain settings to suit different environments. For example, Shop Mode is used in shop environments, with very high luminance to show TVs’ capabilities and attract potential customers. Other modes are typically dimmer for comfortable viewing in average watching environments, such as the living room.

This can be seen in the letters submitted to the EPA by different market players in the process of developing the specifications https://www.energystar.gov/index.cfm?c=archives.tv_vcr_spec

Efficiency level is expressed in letters, whereby “A” is the most environmentally friendly.

Getting access to such information is very difficult, consequently the author was unable to view more than one. This is mainly due to strict IEC privacy conditions.

Evidence from several interviews suggest that NCs prefer to vote Yes by default; they have in principle three options: Yes, No or Abstain.

An umbrella group for 44 independent consumer organisations from 32 European countries.

Verification tolerances are designed to allow for variations that emerge in the measurements taken during verification tests, which are due to the differences in the measurement equipment used by manufacturers and surveillance authorities (EU Commission Regulation 2016/2282).
### APPENDIX: SEMI-STRUCTURED INTERVIEWS

**Table 1. Semi-Structured Interviews**

| No. | Interview Subject                                                                                                                                                                                                 | Date            | Duration       | Method  |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|---------|
| 1   | Widely recognized as a leader in the display community, with a number of inventions and awards. He served at the IEC as the principal architect of the TV energy measuring procedure in the IEC 62087:2008. | April 17, 2019  | Two hours      | Phone   |
| 2   | He was the head of standardization at one of the major displays' manufacturers. He served as the national committee for the US and as a technical area manager at the TC100. He is known for, among other things, spearheading the IEC 62087. He was awarded with eighteen patents related to multimedia. | May 21, 2019    | One hour       | Phone   |
| 3   | A senior standardization manager at one of the major displays' manufacturers. He served as a senior member of multiple technical areas in TC100 as well as acted as an NC. | April 30, 2019  | Two hours      | Phone   |
| 4   | A senior manager at a major telecommunications equipment manufacturer based in the US. He was involved in drafting various international standards and efficiency initiatives, including the European Code of Conduct on the energy efficiency of digital TV devices and the ENERGY STAR program. He acted as an NC at TC100. | April 25, 2019  | One hour       | Phone   |
| 5   | A former engineering vice president at one of the main Plasma TVs manufacturers and acted as an NC at TC100.                                                                                                                                                     | May 8, 2019     | One hour and 30 min. | Phone   |
| 6   | An audio product engineer who is working at one of the major displays' manufacturers. He acted as a project leader for the audio part of IEC 62087.                                                                 | May 15, 2019    | -              | Email   |
| 7   | A standardization manager who is working in one of the national standardization bodies that significantly influenced the IEC 62087.                                                                                                                                  | April 23, 2019  | -              | Email   |
| 8   | A standardization consultant at the Netherlands Standards Institute/ Netherlands Electrotechnical (NEN), and a secretary for the Dutch mirror committee. He was also working with the Dutch consumer association 'Consumentbond.'                                                                 | September 23, 2019 | Two hours     | Phone   |
| 9   | Director at the Royal Netherlands Standardization Institute/ National Secretary at the IEC.                                                                                                                                                                     | January 31, 2020 | Two hours      | Personal |
| 10  | Senior standardization counsel at one of the major displays' manufacturers; Member of the standardization management board at the IEC.                                                                                                                           | January 30, 2020 | Two hours      | Personal |
| 11  | An expert in home appliances' testing. ANEC also hired him for many years.                                                                                                                                                                                       | February 07, 2020 | Two hours      | Phone   |
| 12  | Serves for Public Affairs & Media Relations at the Portuguese consumer association.                                                                                                                                                                           | December 20, 2019 | -              | Email   |
Abdel Fattah Alshadafan spent six years in a testing, inspection, and certification body. There he gained his professional experience in products’ and management systems’ certifications. During that period, he was involved in a range of services that were geared to help governmental institutions in safeguarding their public interest through ensuring that imports meet the requirements of the technical standards set by the local standardization bodies. Abdel is currently a Ph.D. candidate at the Hochschule für Politik/Technical University of Munich. He has a master’s degree in quality management and a bachelor’s degree in Actuarial Sciences. His research primarily focuses on the institutional arrangements of international technical standard-setting bodies. He aims to achieve an improved international standardization model, that ensures a better safeguard for the public interest.