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Reducing Trade Transaction Costs: Harmonization of Standards and Conformity Assessments in APEC

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EXECUTIVE SUMMARY

This report provides information and findings on the evaluation of the Key Performance Indicators of the APEC Sub-Committee on Standards and Conformance (SCSC) for the period 2006-2010 (the period associated with the Second APEC Trade Facilitation Action Plan (TFAPII)).

It is noted that there are research difficulties with the evaluation of the SCSC KPIs. This has been highlighted in previous reports[1]. These difficulties stem from the fact that the KPIs were set towards the end of the reporting period, and there has been no systematic collection of data in relation to the KPIs from the beginning of the period.

As such, a precise evaluation of the KPIs has not been possible. However, by combining existing datasets, some understanding of the trends associated with the KPIs is possible.

The work of the SCSC contributes to trade facilitation and to the trade transaction costs reduction goal of the Second APEC Trade Facilitation Action Plan (TFAP II). It achieves this in a number of ways, including through alignment of APEC member economic technical regulations and domestic standards with selected international standards for certain categories of products.

One area of the SCSC's focus is on trade in electrical and electronic products, which amount to in excess of USD 1 trillion since 2006 in intra-APEC exports per annum. In this space, the SCSC has had an active programme to align APEC member economy technical regulations and domestic standards with standards produced by the International Electrotechnical Commission (IEC). It has also developed the APEC Electrical and Electronic Products Mutual Recognition Agreement (MRA), and to recognise conformity certificates established under the IECEE CB Scheme.

These activities reflect the WTO Technical Barriers to Trade (TBT) Agreement to, where possible, use international standards and recognise international conformity assessment schemes to facilitate trade in goods.

The SCSC KPIs that are the subject of evaluation in this study relate primarily to activities associated with trade facilitation for electrical and electronic products. For each KPI the following high level trends can be identified.

The evaluation of KPI 1 shows that APEC member economies have increasingly aligned their technical regulations and domestic standards with selected IEC standards. In 2006, 10 APEC member economies reported 100% alignment with IEC 60065. In 2008, 14 APEC member economies reported 100% alignment with IEC 60065. In 2010, 15 APEC member economies reported 100% alignment with IEC 60065. Over the period 2006-2010 an increasing number of APEC member economies have aligned their technical regulations to international standards covering electrical safety requirements for televisions.

[1] See ITS Global report entitled: "Reducing trade transaction costs in APEC economies by 5% - Progress with achieving the goals of TFAP II (Interim Assessment of TFAP II (2006-2008) & Proposed Approach for the Final Assessment (2006-2010)".

This has meant that a growing portion of the selected product for this KPI, i.e. televisions, has been imported on the basis of technical regulations and domestic standards aligned with IEC 60065.

For APEC member economies that have provided Voluntary Action Plan (VAP) responses, the share of television imports by value that have been covered by the relevant international standard has increased from 14.9% in 2006 to 94.5% in 2009.

The evaluation of KPI 2, that also relies on APEC members' VAP responses, shows an increased degree of alignment of technical regulations and domestic standards with the standards of the IEC. The number of economies reporting alignment with IEC standards has risen from 12 to 16 economies during the period of 2006 to 2010. In addition, the extent of alignment over the full list of the selected 168 IEC standards has increased. The reported results did range from 55% to 100% in 2006, but are now between 91% and 100% alignment.

The direct evaluation of KPIs 3 and 4 has not been possible in this study. A proposed survey of exporters on changes to costs of compliance (which are the relevant trade transaction costs in the context of standards and conformance) was discouraged by APEC member economies due to data collection difficulties from electronic companies as well as data confidentiality issue.

Instead an analysis of trade values and the number of test certificates issued under the IECEE CB Scheme has been undertaken.

The analysis shows that exports from APEC member economies in electrical and electronic products, including the specific product of televisions, increased during the period 2005 to 2008, and then reduced by approximately 13.3% in 2009 due the contraction in consumer spending brought on by the global financial crisis.

The growth experienced in exports by value of electrical and electronic products before 2009 was in line with global trends, with APEC economies contributing consistently to approximately 66%-69% of world exports.

The number of IECEE CB test certificates issued for televisions over the same period has remained relatively unchanged at around 3000 certificates per annum.

The IECEE CB test certificate issued for all electrical and electronic products has increased significantly over the period.

All these results point to the trend that APEC member economies are aligning their technical regulations and domestic standards with international standards for specific product classes. This has been a deliberate activity in the agenda of the SCSC through the use of Voluntary Action Plans (VAPs).

Furthermore there has been an increase in the number of IECEE CB conformity certificates across the APEC region for electrical and electronic products. This demonstrates the growing use of an international conformity assessment system within the APEC member economies. This reflects the intent of the WTO Agreement on Technical Barriers to Trade.

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1.1. INTRODUCTION

The project focuses on evaluating the progress made by APEC member economies to achieve the Key Performance Indicators (KPIs) of the APEC Sub-Committee on Standards and Conformance (SCSC). These KPIs were established in the context of APEC's Second Trade Facilitation Action Plan (TFAPII) which seeks to reduce trade transaction costs.

The specific SCSC KPIs are:

Table 1-1 APEC SCSC Key Performance Indicators

KPI #	SCSC KPI
KPI 1	Percentage of imports of a specific product covered by international standards under IECEE/CB as opposed to domestic standards where imports, like domestic products, are regulated with specified standards.
KPI 2	Reduction in the number of EE products under IECEE/CB scheme that have to have different specifications to enter markets with different regulatory standards.
KPI 3	Reduction in comparative cost of getting a representative product to market after adoption of agreed international standards.
KPI 4	Change in costs of conformance of products covered by the EEMRA and the IECEE/CB with regulatory standards in import markets.

Source: APEC PSU (2010).

1.2.STANDARDS, CONFORMITY ASSESSMENT AND TRADE

Standards and conformity assessment requirements can influence trade and trade transaction costs.

One of the most recent studies on the economic effects of standards and conformity assessment is the 2007 Standards Council of Canada study[2]. The study notes the current literature on the economic value of standardization can be grouped into four areas:

1. economic rationale for standards;
2. effect on international trade;
3. effect on economic growth and productivity; and
4. the degree of importance that the age of a standard represents.

In relation to the first area, the Canadian study cites David (1987) as providing three economic reasons for standardization, and provides a fourth reason as identified by Swann (2000). These reasons are that standards allow for:

a. compatibility, that enables society to realise benefits of network externalities;
b. minimum admissible attributes, that addresses asymmetry of information in the market between sellers and buyers of goods and services;
c. product descriptors, that enable products and grades of products to be differentiated; and

[2] Haimowitz and Warren (2007).

d. reduction of variety, meaning that production can achieve greater economies of scale and there is more certainty about the future which reduces the risks in investment decisions (e.g. research and development).

Of these, the study highlights that minimum admissible attributes in particular can lead to lower transaction costs based on the theoretical model of Jones and Hudson (1996) and further commentary from Swann (2000).

Swann states (2000, page 6):

> *In a related way, minimum quality or quality discrimination standards can – more generally – reduce what economists call transaction costs and search costs… If the standard defines the product in a way that reduces buyer uncertainty, then first the risk to the buyer is reduced, and second there is less need for the buyer to spend time and money evaluating the product before purchase. Consider a commodity market, for example; how could it exist in the absence of standards? Traders must be able to buy and sell large volumes without even viewing their trades. This is only possible if there is complete confidence about what it is that is being traded. That presumes a clearly defined standard grade, and certification that all produce traded meets that grade.*

Swann (2000, page 8) continues:

> *The producer can confirm that the product to be sold is indeed what he expects it to be, and that reduces the risks (of compensation or litigation) to him, and also the risks to the buyer. In principle, the buyer can buy with confidence and without the need to carry out his own independent test that the product is what it is supposed to be. As such, this sort of certified measurement can help to reduce transaction costs, and hence make markets work better.*

Standards and conformity assessment can also be used as technical barriers to trade, either through inhibiting market access or resulting in a competitive advantage for domestic producers over imported products. This has been an area of research since at least the 1970s (see Baldwin (1970), Roningen and Yeats (1976)). However it is acknowledged that unlike the effects of tariffs, the effect of non-tariff barriers such as divergent standards and conformity assessment procedures on trade are difficult to measure. There is a lack of reliable information on costs to business of standards and conformity assessment procedures as they are generally embedded in the firm-specific costs associated with different potential export markets (OECD 1999).

Some of the complexities in measuring the impact of standards and conformity assessment procedures on trade include:

(a) the differentiation between mandatory standards by regulators and standards that are used 'voluntarily' within the market. For example an OECD (1999) study[3] noted that *for many of the firms interviewed, meeting non-mandatory product requirements was seen as much, if not more, of an issue than meeting mandatory technical standards… local voluntary*

[3] See the 1999 study entitled "An Assessment of the Costs for International Trade in Meeting Regulatory Requirements" by the OECD.

codes and standards, over and above the legislative minimum, are found as the significant requirements for foreign firms hoping to enter the market;

(b) the extent to which standards and conformity assessment procedures are discriminatory in favour of domestic producers;
(c) the size of the firm, including the extent to which it has access to dedicated standards and compliance professionals and that the costs of meeting standards and conformity assessment requirements can be spread over the units of production;
(d) the different conformity assessment models that might be in place and the extent to which firms might carry the costs of compliance. Different conformity assessment models (e.g. the need for pre-market or post-market registrations, product testing and/or certification, and the extent to which self declarations or independent third party conformity assessment bodies need to be used) will have different costs of compliance associated with them;
(e) time and effort measurement including the need to ensure that the time (hours and days) of internal resources are considered. This includes the time taken to identify and understand technical requirements, modify products, gain the necessary registrations, undertake any mandatory conformity assessment procedures, and ongoing administration of registrations and product licences. The OECD (1999) study also notes that it is normally difficult for companies to assess the costs of meeting technical regulations, mandatory product standards and conformity assessment procedures. This is because such costs (salaries, overheads, direct and indirect expenses) are rarely included in a single line item in terms of accounting; and
(f) length of time (duration) it takes to fulfil technical regulations, mandatory product standards and associated conformity assessment procedures. This can be particularly critical where technology is advancing rapidly and product lifecycles are short.

Non-tariff barriers to trade

If employed inappropriately, standards and conformity assessment requirements can be one example of non-tariff trade barriers (NTB). NTBs include[4]:

- quantitative restrictions and similar specific limitations (e.g. quotas);
- non-tariff charges and related policies affecting imports (e.g. antidumping duties);
- government participation in trade, restrictive practices, and more general government policies (e.g. government purchasing policies);
- customs procedures and administrative practices; and
- technical barriers to trade (TBT) (e.g. health and sanitary regulations, quality standards and safety and industrial standards and regulations).

At the level of the World Trade Organisation (WTO), there is an Agreement on Technical Barriers to Trade (TBT) that tries to ensure that regulations, standards, testing and certification procedures do not create unnecessary trade barriers.

Specifically in relation to standards the WTO TBT Agreement Annex 3 notes that:

> *F. Where international standards exist or their completion is imminent, the standardizing body shall use them, or the relevant parts of them, as a basis for the standards it develops, except where such international standards or relevant parts*

[4] Deardorff, A. V. and Stern, R. M. (1997) Measurement of Non-Tariff Barriers, OCDE/GD(97)129 Paris: OECD.

> *would be ineffective or inappropriate, for instance, because of an insufficient level of protection or fundamental climatic or geographical factors or fundamental technological problems.*

And that in terms of conformity assessment the Agreement states in article 9.1:

> *9.1 Where a positive assurance of conformity with a technical regulation or standard is required, Members shall, wherever practicable, formulate and adopt international systems for conformity assessment and become members thereof or participate therein.*

In summary, where possible, WTO members should rely on international standards and participate in international systems of conformity assessment.

Economic benefits of standards

Viewed within the framework of TFAP II, (international) standards is seen as one of the policy tools for trade transaction costs reduction. While standards harmonization indeed provides potential benefits in reducing trade transaction costs, international standards also provides significant benefits for firms and societies.

A recent study by AFNOR (2009) on measuring the impact of standards towards the French economy yields the following findings:

- From a macroeconomic standpoint, standardization directly contributes to the growth in the French economy. Standardization contributes an average of 0.81% per year, or almost 25% of GDP growth. This is in line with figures for other technological leading countries, such as Germany and the United Kingdom.
- Based on an in-depth survey of 1,790 companies or organizations of all sizes and from all sectors of activity: over 66% of the companies interviewed stated that standardization contributes to the generation of profits, proving that it has a positive impact on a company's value.

ISO has also recently published some sort of methodology guide or toolbox in order to measure the value for an organization in using standards. ISO (2010) noted the following examples related with the effects of standard along the entire organization value chain:

- Reduction of transaction costs and more efficient handling of interfaces are major benefits in operations and logistics.
- Improved pricing, enhanced market access as well as easier customer servicing are benefits on the marketing/customer side.
- Technological transfer, interoperability and risk reduction are key benefits within R&D activities in addition to lower costs in procurement.

1.3. WORK UNDERTAKEN BY THE APEC SCSC

Relying on international standards and participating in international conformity assessment systems has been a focus within APEC since its establishment in 1989. In the case of technical barriers to trade APEC has established the Sub-Committee on Standards and Conformance (SCSC).

The SCSC's mandate[5] includes how standards and conformity assessment procedures can be adapted to reduce the likelihood that they may constitute technical barriers to trade. One of the ways this has been achieved over the past decade is that APEC member economies have taken steps to align their domestic technical regulations and standards with international standards. In particular there has been specific emphasis on alignment with the international standards of the International Electrotechnical Commission (IEC) that covers electrical and electronic products. The results of this alignment process have been reported through Voluntary Action Plan responses from APEC member economies.

It is noted that several APEC member economies have mandatory pre-market product safety registration schemes for electrical and electronic products that utilise IEC standards and recognised conformity certificates issued with the IECEE CB scheme. Alternatively, in the absence of mandatory requirements, importers and retailers in some APEC member economies also use relevant IEC standards and conformity certificates as part of their market driven supply chains. In both cases these are examples within APEC member economies where international standards and conformity assessment system are being used to facilitate trade and not act as trade barriers.

Examples of regulatory schemes include:

- Singapore Consumer Protection (Safety Requirements) Registration Scheme (http://www.spring.gov.sg/QualityStandards/CPS/Pages/consumer-protection-registration-scheme.aspx#overview) which covers electrical and gas appliances, plugs and fittings; and
- China Compulsory Certificate (CCC) scheme (http://www.cnca.gov.cn/cnca/cncatest/20040420/column/227.htm) that covers many types of consumer products sold in the Chinese market.

[5] APEC (2009), APEC SCSC – Terms of Reference, 2009/SOM1/SCSC/034 and APEC (2005), Blueprint APEC SCSC (Sub Committee on Standards and Conformance).

2. RESEARCH OBJECTIVES AND METHODOLOGY

2.1. RESEARCH OBJECTIVES

In general, the objective of the research is to measure and assess the Standards and Conformance Key Performance Indicators (KPIs) under the Trade Facilitation Action Plan II for determining the contribution of SCSC actions in reducing trade transaction costs.

Specific research objectives related with the individual KPIs are as follows:

1. **KPI 1** is the percentage of imports of a specific product covered by international standards under IECEE/CB as opposed to domestic standards where imports, like domestic products, are regulated with specified standards.

The associated research objective is to establish since 2005 the percentage of imports that meet the requirements of IEC standards as opposed to different domestic standards. In terms of definitions it was confirmed that televisions will be the specific product and that HS code 8528 would be used to establish trade figures.

2. **KPI 2** is the reduction in the number of EE products under IECEE/CB scheme that must have different specifications to enter markets with different regulatory standards. The associated research objective for this KPI is to review since 2005 the number of electrical and electronic products that have to meet IEC standards as opposed to different domestic standards.

In terms of definitions it was confirmed that the VAP responses for 2006, 2008 and 2010 from each APEC member economy would be used as an indicator of the extent to which technical regulations and domestic standards differed from (i.e. were not aligned with) the IEC standards used in the IECEE CB scheme. Economies that have not provided any response have been excluded.

3. **KPI 3** is the reduction in comparative cost of getting a representative product to market after adoption of agreed international standards.

Effective evaluation of KPIs 3 and 4 which relate to changes in the costs of compliance faced by exporters of electrical and electronic products has not been able to be achieved. The Inception Report proposed a methodology that included surveying exporting companies within APEC member economies, followed up with structured interviews with the main exporting companies. However this approach was discouraged by APEC member economies due to data collection difficulties from electronics companies as well as data confidentiality issues; and instead the study was asked to review the number of certificates that has been issued under the IECEE CB scheme.

The following sections on KPIs 3 and 4 reflect this approach but cannot make informed comments on changes to costs of compliance faced by exporters.

As in KPI 1, KPI 3 is product specific. Televisions (as represented in HS 8528) have been selected as the specific product. The agreed international standard for the reference product is IEC 60065, *Audio, video and similar electronic apparatus - Safety requirements*.

4. **KPI 4** is the change in costs of conformance of products covered by the EEMRA and the IECEE/CB with regulatory standards in import markets.

As mentioned above in KPI 3, a count of issued test certificates within the IECEE CB scheme has been undertaken.

Trade data has also been gathered to gain a perspective on the trade values of electrical and electrical products. Considering the products covered by the APEC EE MRA and IECEE CB Scheme, the following HS codes (02) have been selected:

- 8418 Refrigerators
- 8450 Washing machines
- 8471 Computers
- 8443 Printers
- 85 Electrical and electronic equipment

2.2. SCOPE OF THE STUDY

The Inception Report for this study was presented to the APEC SCSC meeting in March 2011. The SCSC noted the report, and recommended that instead of surveying industry on trade transaction costs as was proposed in relation to KPI 3 and 4, that the project should focus on a more desk-top analysis of existing data about the IECEE CB Scheme.

This has meant that KPIs 1 and 2 can be evaluated through the methodology presented to the SCSC, but that KPIs 3 and 4 cannot be directly evaluated.

2.3. RESEARCH METHODOLOGY AND DATA SOURCE

The compiled data was principally sourced from the United Nations trade database, past Voluntary Action Plan (VAP) returns from APEC member economies, and through consultations with the IECEE CB Scheme Secretariat.

Specific data source and methodology for each KPI is explained as follows:

KPI 1: In terms of the methodology used for evaluating this KPI, it was agreed to confirm the US dollar value of imports for each APEC member economy for each year from 2005 to 2009 for televisions. For those same years, also confirm the extent of adoption by each APEC member economy of the corresponding IEC standard as identified in their VAP returns. Using these two datasets, calculate the share of total imports by value covered by international standards.

KPI 2: In terms of the methodology used for evaluating this KPI, it was agreed to use the VAP results to show the percentage of alignment with the 168 IEC standards.

KPI 3: The following datasets were developed as part of the methodology:

- a tabulation of export value figures for televisions since 2005 to 2009, from both the perspective of exports to other APEC member economies (intra-regional trade) and exports to the world in general; and
- a count of test certificates issued for televisions under the IECEE CB scheme for the same period.

The revised methodology adopted by the SCSC for this KPI is to provide a count of IECEE CB scheme certificates for television products. While these certificates are used in transactions between buyers and sellers of televisions, they do not cover all television products trade because not all televisions are traded on this basis.

After enquiries with the IECEE CB Scheme Secretariat, the research team was able to gain some data on the number of certificates issued and recognized under the scheme.

The IECEE CB Scheme covers many electrical and electronic products. Certificates for these products are issued when the product complies with one or more of the IEC standards that are used in the Scheme (see Appendix 1). As can be seen the Scheme groups products in a specific way. For the purpose of KPI 3, which focuses on televisions, the data for the categorization of TRON (Electronics, entertainment) is relevant. All categorizations are relevant from the broader perspective of all electrical and electronic products that is the focus of KPI 4.

In relation to KPI 3 and its specific focus on televisions, the data provided by the IECEE Scheme Secretariat consisted of MS Excel spread sheets listing every certificate issued in each of the years from 2002-2010 for TRON. On average TRON have around 25,000 certificate entries (individual rows in each annual spreadsheet). Certificates are issued for a specific make and model of the product and in some cases can relate to a single factory, or production site, and in others to as many as 13 factories or production sites located in different economies.

In each of the 25,000 plus rows per annum included in the spreadsheets, there is a product description cell. The product description cell is a free text entry, and there is no consistency of how the product descriptions have been entered. Televisions, for example, are listed in numerous ways reflecting the different types and sizes of the device (e.g. cathode ray tube, plasma television, 22 inch LCD television receiver, 24 inch flat screen, etc.), and in some cases it is not entirely clear whether the description relates to a television or not. Because of this the count of certificates issued for televisions can only be approximate. To identify which rows, and hence which certificates, should be counted for televisions has been a time consuming process.

KPI 4: The following datasets were developed as part of the methodology:

- a tabulation of export value figures for electrical and electronic products since 2005 to 2009, from both the perspective of exports to other APEC member economies (intra-regional trade) and exports to the world in general; and
- a count of test certificates issued and recognised under the IECEE CB scheme for all categories of electronic and electrical products the same period.

2.4. DEFINITIONS AND ASSUMPTIONS

There are some key terms that need to be defined in the context of this project. The terms include:

- trade transaction costs;
- mandatory technical standards; and
- conformity assessment activities.

Trade transaction costs

As explained in the Inception Report there is no internationally agreed definition of trade transaction costs. Within APEC, the Committee on Trade and Investment (CTI) has adopted the following definitions based on work undertaken by ITS Global (Table 2.1, page 28):

Table 2-1 Typology of trade transaction costs under TFAP II

Priority Area	Trade facilitation function of government or agent [(a)]	Activity for trader	Cost to trader
Customs Procedures	Levy taxes (including tariffs, sales taxes, VAT, etc) Administer collection of funds	Pay charge Follow administrative procedures Maintain additional inventory	Fees & charges Compliance costs Time taken
Business Mobility	Require compliance with immigration, visa and residency rules	Secure approval to travel (entry and exit) Pay visa charge	Time taken Fees & charges Compliance costs
Standards and Conformance	Require compliance with mandatory standards and demonstration of conformance	Alter product/process to meet standard Secure conformance of compliance	Compliance costs Time taken
Electronic Commerce	No specific agency functions: spread across functions above	Achieve document and data integration, interoperability and authentication Effect electronic transactions	Compliance costs Time taken

Note: (a) Refers to functions which relate to trade facilitation that have a direct bearing on trade transaction costs. It is recognized that agencies have wider functions, such as border protection and quarantine in the case of customs.
Source: APEC PSU (2010).

In the case of standards and conformance the above table notes the primary effect on trade facilitation is compliance with mandatory standards and demonstration of conformance, and in terms of costs it refers to compliance costs and the time taken.

Given this understanding and taking into account the wording of the SCSC KPIs, a definition of trade transaction costs for the purposes of this project must focus on the costs of compliance and the time taken by exporters of electrical and electronic products to meet mandatory standards. The confirmed definition is:

> ***Costs of conformance: Costs in terms of time and money of complying with mandatory standards and undertaking any mandatory conformity assessment activities.***

While the above explanation and definition is useful in understanding trade transaction costs in the context of standards and conformance, it is noted that subsequent to the APEC SCSC meeting in March the application of this definition in the research is not immediately required. This is because the research methodology that was agreed no longer includes an industry survey on the *costs of conformance*.

The OECD study does provide a useful typology in terms of how to segregate compliance costs. In the study it identifies four phases of costs which can be adopted in this APEC study:
a) discovering and understanding the technical regulations, mandatory product standards and conformity assessment procedures in the export market that relate to product safety;
b) applying for any mandatory product registration and/or marking scheme for access to the export market;
c) undertaking any mandatory conformity assessment (testing and/or certification) procedures; and
d) any other costs associated with processing or ongoing administration of mandatory requirements to maintain access to the export market (for example, the ongoing costs of undertaking surveillance activities that might be required for product registration).

Mandatory technical standards

The mandatory technical standards relevant to this project are the group of 168 IEC standards that were adopted in 2006 by the SCSC for alignment through Voluntary Action Plans (VAPs)[6]. These standards are listed in Appendix 1, and summarised as covering the following products:

- Installation accessories and connection devices
- Lighting
- Electrical equipment for medical use
- Portable tools
- Switches for appliances and automatic controls for electrical household appliances
- Installation protective equipment
- Measuring instruments
- Low voltage, high power switching equipment
- Safety transformers and similar equipment
- Cables and Cords
- Capacitors as components
- Electronics, entertainment
- (Batteries, IT and office equipment, Miscellaneous, and Household and similar equipment were excluded).

In terms of identifying an electrical and electronic product for the more specific KPIs (KPIs 1 and 3) it was agreed that ***televisions***, and their adherence to IEC 60065, *Audio, video and similar electronic apparatus - Safety requirements*, would be selected.

[6] See APEC 2006/SOM1/SCSC/006.

This is because this product was:
(a) covered by one of the 168 IEC standards that were adopted in 2006 by the SCSC for alignment through Voluntary Action Plans;
(b) covered by the same IEC standard that is used within the IECEE CB Scheme;
(c) was included within the APEC EEMRA ; and
(d) has a high US dollar value in terms of imports across APEC member economies.

The scope of IEC 60065 includes televisions, but also extends to other audio, video and similar electronic apparatus. The formal abstract of the standard is it "*Applies to receiving apparatus for sound or vision, amplifiers, load and source transducers, motor-driven apparatus (radio-gramophones, tape recorders and sound-film projectors, etc.) which are to be connected to the mains, directly or indirectly, and which are intended for domestic and similar indoor use. Gives a safety and classification terminology based on IEC 60536. Specifies requirements for marking, insulation, components, electrical connections and fixings, protection against ionizing radiation, resistance to heating, mechanical strength and stability, etc., as well as a requirement for splash-proof mains operated electronic equipment. Does not apply to apparatus designed for rated supply voltage exceeding 433 V (r.m.s.) between phases in the case of three-phase supply and 250 V (r.m.s.) in all other cases.*"

In terms of matching the specific product of televisions with relevant trade data, the 2002 HS classification used is 8528. The official name from the UN Comtrade database for this category is *Reception apparatus for television - Description: Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors.*

It must be noted that use of HS 8528 is the closest approximation of UN Comtrade data for televisions, but it is not an exact match and also includes other devices as mentioned in the description above.

Conformity assessment activities

The types of conformity assessment activity relevant to this project, the APEC EEMRA and the IECEE CB Scheme are:
- product testing in accordance with ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*, and the specific testing methods prescribed in IECEE CB standards; and
- product certification in accordance with ISO/IEC Guide 65:1996, *General requirements for bodies operating product certification systems*.

Generally speaking manufacturers employ conformity assessment activities to satisfy themselves, their customers, and in some cases regulators (in the case of mandatory standards), that their products conform to specified requirements. These specified requirements are often set out in standards, like those standards identified in the VAP.

There are many ways in which conformity assessment activities can be undertaken and combined to provide assurance that a product fulfils requirements (i.e. the safety requirements in IEC 60065). A common method is for the manufacturer to organise samples of its products to be tested in a testing laboratory. There is an international standard, ISO/IEC 17025, which sets out general requirements for the technical competence and management of such laboratories. The result of the testing activity is a test report (or test

certificate in the case of the IECEE CB Scheme). Test reports can then be used by the manufacturer to demonstrate to its customers that its product complies with the relevant standard.

Other forms of conformity assessment also use test reports as one of several evidential inputs. In circumstances where production takes place continuously other inputs can include in-factory production controls and quality management systems. Product certification bodies consider these inputs and may then issue a product certificate, which then applies to all the products assuming the product characteristics remain the same. Such product certification is often demonstrated through placing product certification marks on the products (see the underside of a laptop computer for example). Like testing laboratories, product certification bodies also have a set of internationally agreed requirements covering their operations and certification processes. These requirements are set out in ISO/IEC Guide 65.

In the market it is recognised that customers and regulators may impose specific requirements for manufacturers to have their products tested and certified. In an attempt to avoid duplication of these requirements and thus multiple sets of compliance costs some sectors have established product certification schemes where test reports and certificates may be accepted by more than a single customer or regulator. A successful example of this has been in the electrical and electronic sector, with the IECEE CB Scheme, and the APEC EE MRA.

IECEE stands for "The IEC System for Conformity Testing and Certification of Electrical and Electronic Components, Equipment and Products". The acronym CB Scheme simply means “Certification Bodies’ Scheme”.

The following is an extract from IECEE CB promotional material:

> *The IECEE CB Scheme is an international system for mutual acceptance of test reports and certificates dealing with the safety of electrical and electronic components, equipment and products. It is a multilateral agreement among participating countries and certification organizations.*
>
> *A manufacturer utilizing a CB test certificate issued by one of the accepted National Certification Bodies (NCBs) can obtain certification marks of the latter, within their scope of adherence, in the countries where the accepted NCBs are located.*
>
> *The CB Scheme utilizes CB Test Certificates to attest that product samples have successfully passed the test conditions and are in compliance with the requirements of the relevant IEC Standard(s). When applicable, the CB Test Certificate and it’s associated Test Report can also include declared national differences, Special National Conditions (SNC) and Regulatory Requirements of various member countries.*
>
> *The main objective of the Scheme, is to facilitate trade by promoting harmonization of the national standards with international Standards and cooperation among accepted NCBs worldwide in order to bring product manufacturers a step closer to the ideal concept of "one product, one test, one mark, where applicable”.*

The IECEE CB Scheme is voluntary and is the basis of some, but not all, trade transactions in electrical and electronic products.

Customers and regulators (where electrical and electronic products are regulated) can impose different requirements on manufacturers and suppliers and do not necessarily have to embrace the IECEE CB Scheme. A common alternative is to rely on the test report alone providing it has come from a testing laboratory that has been independently accredited as fulfilling ISO/IEC 17025, and that the accreditation body providing the accreditation is a member of the APLAC MRA.

The implication of this flexibility is to understand that not all trade in electrical and electronic products is facilitated through the use and recognition of IECEE CB Scheme certificates, and that correlating trade statistics with changes in the number of IECEE CB Scheme statistics can be only indicative at best.

It is noted that not all APEC member economies participate in the IECEE CB scheme. The economies and relevant national certification bodies that are directly involved include:

Table 2-2 APEC member economies that are members of the IECEE CB Scheme and relevant certification bodies

APEC Member Economy	National Certification Body(ies)
Australia	SAI Global
Canada	CSA International Underwriters Laboratories of Canada Inc. QPS Evaluation Services, Inc.
China	CQC
Indonesia	Sucofindo International Certification Services (SICS)
Japan	Japan Electrical Safety and Environment Technology Laboratories (JET) Japan Quality Assurance Organization (JQA) TÜV Rheinland Japan Ltd. UL Japan, Inc.
Korea	Korea Testing Laboratory (KTL) Korea Testing Certification (KTC) Korea Testing & Research Institute (KTR) Korea Electrotechnology Research Institute (KERI) New and Renewable Energy Center (NREC)
Malaysia	SIRIM QAS International Sdn. Bhd. (SIRIM)
Mexico	Asociación de Normalización y Certificación, A.C. (ACNE)
New Zealand	N/A
Russia	GOST Re
Singapore	Intertek Testing Services (Singapore) Pte Ltd TÜV SÜD PSB Pte. Ltd.
Thailand	Thai Industrial Standards Institute (TISI)
United States	Underwriters Laboratories Inc. MET Laboratories, Inc. ITS - Intertek Testing Services, N.A. TUV Rheinland of North America, Inc.

Source: IECEE website

It should be noted that in many cases the above certification bodies are commercial companies that have made a business decision to participate in the IECEE CB Scheme. In most cases these certification bodies certify many products under many different certification schemes, and are not focused on just the IECEE CB Scheme certification as their only certification activities. Economies that do not have certification bodies in the IECEE Scheme

may not require them as they have little or no electrical and electronic product manufacturing, or there is no specific regulatory requirement for IECEE CB certification in their market.

The actual issuance of certificates is undertake by the above product certification bodies following the product certification process outlined in ISO/IEC Guide 65 and in accordance with the rules of the IECEE CB Scheme. This involves an application from a manufacturer to have a product certified, the identification and testing of a sample of the product, and a determination by the product certification body on the basis of the test report whether the product complies with the relevant IEC standard. If this determination is position a test certificate is issued for the model and make of product provided by the manufacturer.

Assumptions and Limitations

The following assumptions and limitations are identified for the project given the timeframes, budget and practicalities of collecting and analysing data and providing informative findings.

General limitations

As stated in the Request for Proposal (RFP) and highlighted in the 2010 ITS Global report[7], it is difficult to effectively measure the SCSC KPIs. Issues include:

- many of the actions and measures of SCSC are not designed to quantify reductions in trade transaction costs; and
- information for such purposes does not exist or are not available within APEC member economies.

The literatures and secondary data on the impact of standards on transaction costs are limited and rather outdated. The research strategy related with impact measurement of standards in general follows the following approaches:

1. **Macro approach**. In this type of research the impact of standards is done through applying some sort of gravity model with the count of standards variables as one of the right-hand-side (RHS) variables. For a collection of these kinds of studies please refer to Swann (2010).
2. **Direct surveys**. These studies basically collect information directly through surveys from firms and other relevant stakeholders as an attempt to understand how the application of standards might create additional trade barriers for firms. This type of studies is even more limited. The study by Fliess and Schonfeld (2006), OECD (1999), and Wilson and Otsuki (2004) could be grouped under this category.

Use of Reports of Voluntary Action Plans

The proposed methodology for this project relies heavily on the Voluntary Action Plan (VAP) returns submitted on an occasional basis by APEC member economies. These VAP returns identify the degree to which selected IEC standards covered by the IECEE CB

[7] The ITS Global report entitled: "*Reducing trade transaction costs in APEC economies by 5% - Progress with achieving the goals of TFAP II (Interim Assessment of TFAP II (2006-2008) & Proposed Approach for the Final Assessment (2006-2010)".*

Scheme have been adopted in each APEC member economy, and whether they are used as the basis for technical regulation.

Since 1996 APEC member economies have been encouraged to adopt international product standards associated with the IECEE CB Scheme as part of their VAPs. The assumption has been that with the adoption of the same international standards by APEC member economies, the need for industry to invest in understanding and designing products to meet differing national standards, and to undertake specific or repeated conformity assessment procedures to access markets (e.g. product testing and certification), will be reduced.

In 2006 a new VAP reporting template was adopted as was recommended in 2006/SOM1/SCSC/006.

Japan has been the APEC member economy that has collected these returns over the past decade and it has made periodic reports on progress in alignment to APEC SCSC meetings. The specific reports that will be considered for this study are those summarised in the following table. It is important to note that not all APEC member economies have provided returns in time for inclusion in these reports[8].

Table 2-3 Voluntary Action Plan Results 2006-2010

Year	2006	2008	2010
Relevant document	2008/SOM3/SCSC/006 Report on the 2008 Voluntary Action Plan (VAP) Results	2008/SOM3/SCSC/006 Report on the 2008 Voluntary Action Plan (VAP) Results	2010/SOM3/SCSC/017 Report on the 2010 Voluntary Action Plan (VAP) Results Updated with 2011/SOM1/SCSC/027
APEC member economies included	Brunei Darussalam Chile Hong Kong, China Indonesia Japan Republic of Korea Malaysia New Zealand Singapore Chinese Taipei Thailand The United States	Australia Brunei Darussalam Canada Chile Hong Kong, China Indonesia Japan Malaysia New Zealand Peru The Philippines Singapore Chinese Taipei Thailand The United States Viet Nam	Australia Brunei Darussalam Chile Hong Kong, China Indonesia Japan South Korea Malaysia New Zealand Papua New Guinea Peru Philippines Singapore Chinese Taipei The United States Viet Nam
Total	12 economies	16 economies	16 economies

Source: 2008/SOM3/SCSC/006, 2008/SOM3/SCSC/006 and 2010/SOM3/SCSC/017, Malaysia's 2010 VAP Alignment Work.

For the purpose of this work, modified and identification adoptions of the specified IEC standard will be considered as being 100% alignment and that at the point an APEC member economy confirms it has aligned to the specified IEC standard in their VAP returns, all imports of the specified product will be assumed to be regulated and imported in accordance with that standard.

[8] See 2010/SOM3/SCSC/017 Report on the 2010 Voluntary Action Plan (VAP) Results.

For economies that did not provide Voluntary Action Plan returns for one of the years 2006, 2008 or 2010, then the most recent return will be used. Economies that have not provided any return for any of the years will be excluded (this includes the People's Republic of China, Mexico, and Russia).

Furthermore it should be noted that APEC member economies may have aligned their domestic standards with those identified in the VAP for different reasons. In some cases an economy may have adopted the standard which is then used on a voluntary basis between buyers and sellers in the market place, and not explicitly for the purposes of demonstrating conformity with technical regulations.

For some products there are other standards and technical regulations that might apply to the import of the product that are not in the list of standards identified in the VAP.

These practical realities are a limitation to the research methodology in this project, and care must be applied in interpretation of VAP results, and their ultimate linkage with reducing trade transaction costs.

Time period and inflation

The principal years covered in the study are from 2005 to 2009. This aligns with APEC's Second Trade Facilitation Plan. Inflationary effects have been taken into account with the assistance of the APEC Policy Support Unit (PSU).

3. FINDINGS AND ANALYSIS ON THE KEY PERFORMANCE INDICATORS

This section presents the main findings in relation to each KPI.

3.1. ANALYSIS ON KPI 1

As identified in the methodology this KPI can be measured by selecting one specific electrical and electronic product, in this case televisions, and determining whether import of that product has been regulated through the use of a standard that is aligned to a relevant international standard. For televisions the selected international standard is IEC 60065, *Audio, video and similar electronic apparatus - Safety requirements*.

IEC 60065 was identified as one of the mandatory standards for voluntary alignment from 2006 onwards. From 2006 APEC member economies have increasingly aligned their technical regulations and domestic standards with this IEC standard as show in the table below.

Using the VAP results, specifically those relating to the percentage of alignment with IEC 60065, and matching these with import trade figures for televisions, a percentage of imports can be calculated to show a general trend.

In 2006, 10 APEC member economies reported 100% alignment with IEC 60065. In 2008, 14 APEC member economies reported 100% alignment with IEC 60065. In 2010, 15 APEC member economies reported 100% alignment with IEC 60065. Over the period 2006-2010 an increasing number of APEC member economies have aligned their technical regulations to international standards covering electrical safety requirements for televisions.

For APEC member economies that have provided Voluntary Action Plan responses, the share of television imports by value that have been covered by the relevant international standard have increased from 14.9% in 2006 to 94.5% in 2009.

Table 3-1 Percentage and value (USD) of imported televisions covered by IEC 60065 (inflation adjusted, 2009 prices)

	2006	VAP 2006	Value of imports covered IEC 60065	2008	VAP 2008	Value of imports covered IEC 60065	2009	VAP 2010	Value of imports covered IEC 60065
Australia	1,550,185,537	100	1,550,185,537	1,982,236,500	100	1,982,236,500	2,110,703,637	100	2,110,703,637
Brunei Darussalam	5,714,751	100	5,714,751	..	100	..	..	100	..
Canada	2,410,656,767		-	3,197,343,760	100	3,197,343,760	2,472,567,215	100	2,472,567,215
Chile	293,603,400		-	331,230,140		-	292,709,733		-
China	134,751,251		-	216,967,718		-	116,269,039		-
Hong Kong, China	1,595,394,997	100	1,595,394,997	1,143,190,267	100	1,143,190,267	991,678,490	100	991,678,490
Indonesia	47,749,984	100	47,749,984	44,578,843	100	44,578,843	83,483,877	100	83,483,877
Japan	1,318,465,343	100	1,318,465,343	1,351,903,030	100	1,351,903,030	2,387,315,225	100	2,387,315,225
Korea	272,977,516	100	272,977,516	302,195,614	100	302,195,614	211,414,236	100	211,414,236
Malaysia	147,025,353	100	147,025,353	103,562,183	100	103,562,183	136,732,809	100	136,732,809
Mexico	851,039,244		-	1,201,090,756		-	1,254,016,329		-
New Zealand	198,891,968	100	198,891,968	280,697,690	100	280,697,690	230,831,458	100	230,831,458
Papua New Guinea	..		..	..		..	..		..
Peru	137,998,883		-	225,847,182		-	191,076,116		-
Philippines	94,310,796		-	117,775,934	100	117,775,934	120,887,955	100	120,887,955
Russian Federation	416,605,908		-	967,367,499		-	408,542,169		-
Singapore	708,719,989	100	708,719,989	889,176,112	100	889,176,112	561,542,517	100	561,542,517
Chinese Taipei	247,706,892		-	318,033,184	100	318,033,184	440,619,207	100	440,619,207
Thailand	153,499,065	100	153,499,065	195,162,512	100	195,162,512	218,195,550	100	218,195,550
United States	29,574,223,457		-	33,895,855,286		-	28,896,302,313	100	28,896,302,313
Viet Nam	153,104,175		-	86,144,580	100	86,144,580	155,934,118	100	155,934,118
Totals	40,312,627,405		5,998,624,502	46,850,360,818		10,012,000,210	41,280,824,002		39,018,208,607

Note: Data for Brunei Darussalam are only available for 2006; Data for Papua New Guinea are not available; Data on Chinese Taipei as a trading partner, are the mirror data from Chinese Taipei's own reports.

Data source: UN Comtrade; Chinese Taipei's Bureau of Foreign Trade

Key: 100 = presumed value given previous VAP submissions

= no Voluntary Action Plan (VAP) responses in relation to alignment with IEC 60065

Source: Author's calculation based on UN COMTRADE data.

In summary, as reported through Voluntary Action Plan results from APEC member economies from 2006 to 2010, there has been an increased level of reported alignment of domestic standards and technical regulations with IEC 60065.

Based on combining these reported alignment results with the trade data on televisions (HS 8528) over the period, an increasing proportion of imports appear to have been covered by technical regulations and domestic standards that are aligned with IEC 60065.

It is noted that IEC 60065 was one of 168 IEC standards selected for alignment for the VAP period from 2006-2010.

3.2. ANALYSIS ON KPI 2

The following table identifies the degree of alignment indicated in VAP responses from APEC member economies.

Table 3-2 Reported Degree of Alignment with IEC Standards Identified in the 2006-2010 Voluntary Action Plan (VAP)

	Alignment Degree (%)		
	2006	2008	2010
Australia	..	100	100
Brunei Darussalam	100	100	100
Canada	..	67	..
Chile	100	100	100
Hong Kong, China	100	100	100
Indonesia	100	100	100
Japan	87	90	99
Korea	99	..	100
Malaysia	100	99	100
New Zealand	100	100	100
Papua New Guinea	..	..	100
Peru	..	89	100
Philippines	..	90	91
Singapore	100	100	100
Chinese Taipei	100	100	100
Thailand	54	57	..
United States	54	55	100
Viet Nam	..	98	100

Source: 2008/SOM3/SCSC/006, 2008/SOM3/SCSC/006 and 2010/SOM3/SCSC/017, Malaysia's VAP Alignment 2010 Work.

In 2006, 12 APEC member economies reported their degree of alignment with the 168 IEC standards that had been adopted as part of the Voluntary Action Plan. The degree of alignment reported for each APEC member economy that responded ranged from 54% to 100%.

In 2008, the number of APEC member economies reporting had increased to 16, with alignment percentages ranging from 55% to 100%.

By 2010, the same number of responding economies (16) had alignment percentages between 91% and 100%, with a significant majority reporting 100% alignment.

These results illustrate that since 2006 an increasing number of APEC member economies have aligned their technical regulations and domestic standards to the 168 IEC standards that were selected as part of the Voluntary Action Plan for the 2006-2010 period.

With the increasing levels of alignment of technical regulations and domestic standards with IEC standards there has been a reduction in the number of electrical and electronic products facing differing technical requirements to enter APEC markets.

3.3. ANALYSIS ON KPI 3

The following table shows the value of television exports for each APEC member economy, intra-APEC trade and the World from 2005-2009. Figures in the UN Comtrade database were not complete for 2010 for all economies at the time of the research so the period 2005-2009 is provided.

Table 3-3 Value (USD) of exports of televisions (HS (02) code 8528), inflation adjusted – 2009 prices

APEC member economy	2005		2006		2007		2008		2009	
	Intra APEC	World	Intra APEC	World	Intra APEC	World	Intra APEC	World	Intra APEC	World
Australia	22,992,105	29,207,954	21,733,726	29,573,383	19,955,592	22,716,244	25,603,918	29,587,157	17,316,763	21,009,061
Brunei Darussalam	..	..	274,313	563,729	..	..	..	..	..	..
Canada	121,777,641	149,714,972	198,879,988	236,610,801	197,408,246	221,535,754	182,332,565	235,107,584	341,620,853	424,767,868
Chile	340,622	1,104,984	736,572	1,343,977	1,160,286	1,727,879	2,406,118	6,902,669	4,134,797	6,297,889
People's Republic of China	6,348,584,447	9,229,194,541	9,817,741,626	13,757,447,000	13,577,012,809	18,440,291,005	13,509,009,243	18,321,367,640	11,907,089,833	16,358,108,523
Hong Kong, China	833,180,225	1,311,950,257	957,398,674	1,527,764,993	486,917,577	871,185,292	491,166,112	751,041,355	467,622,165	751,069,926
Indonesia	151,589,953	300,682,692	177,446,485	350,481,207	111,010,336	177,075,617	194,487,654	295,791,805	238,551,733	318,719,412
Japan	3,288,397,048	4,271,862,886	2,508,944,508	3,540,378,179	1,469,802,305	2,189,874,258	1,212,470,262	1,831,315,268	685,981,899	960,704,679
Korea	1,659,042,013	3,239,657,158	1,143,198,901	2,417,384,692	909,392,040	1,933,537,637	784,490,312	1,761,627,057	824,679,666	1,718,237,974
Malaysia	1,646,742,359	2,040,414,356	1,058,104,227	1,369,350,301	970,242,513	1,404,069,605	1,003,232,775	1,745,111,351	1,647,386,809	2,412,929,309
Mexico	10,747,216,442	11,310,476,368	16,927,889,541	17,666,375,528	20,257,292,010	20,910,177,793	21,799,407,254	22,680,593,485	17,173,005,082	17,932,801,010
New Zealand	3,891,784	4,708,800	3,430,076	4,401,595	4,364,278	5,277,001	4,414,923	5,261,812	2,580,067	3,724,182
Papua New Guinea	..	..	..	..	..	..	..	..	..	..
Peru	155,464	168,878	66,568	83,473	14,722	77,661	71,835	138,949	1,437,165	2,323,199
Philippines	12,819,461	31,671,468	10,170,506	22,139,836	11,854,527	25,298,596	7,707,876	8,125,980	6,955,478	7,681,284
Russia	166,376	10,759,574	1,304,267	17,365,068	745,296	12,825,084	344,921	6,766,679	1,102,277	42,330,995
Singapore	267,019,590	587,842,513	220,670,023	484,455,891	252,222,958	509,892,914	296,526,922	760,621,118	186,609,254	547,059,751
Chinese Taipei	2,188,161,436	2,678,893,703	2,432,947,626	2,839,475,883	2,348,283,754	2,594,441,417	1,458,025,340	1,608,261,985	886,192,059	980,938,164
Thailand	1,397,136,085	1,817,299,869	1,618,075,862	2,107,695,190	754,617,176	1,364,108,702	840,099,511	1,349,440,116	778,653,528	1,299,924,325
United States	1,679,365,892	2,012,658,819	2,199,238,153	2,625,330,943	2,185,682,309	2,686,318,239	2,156,592,919	2,653,667,862	2,382,100,285	2,800,901,265
Viet Nam	12,406,669	76,153,510	17,257,011	81,552,126	33,077,855	94,473,555	26,945,789	87,723,379	32,323,023	64,814,265
APEC total	**30,380,985,610**	**39,104,423,301**	**39,315,508,653**	**49,079,773,795**	**43,591,056,586**	**53,464,904,255**	**43,995,336,249**	**54,138,453,252**	**37,585,342,736**	**46,654,343,081**
World total		**62,817,556,056**		**82,218,294,096**		**92,292,032,144**		**97,368,770,181**		**85,101,425,312**

Note: Data for Brunei Darussalam are only available for 2006; Data for Papua New Guinea are not available; Data on Chinese Taipei as a trading partner, are the mirror data from Chinese Taipei's own reports.

HS (2007) is used for Chinese Taipei (year 2009) as reporter and as partner of other economies. Source: UN Comtrade; Chinese Taipei Bureau of Foreign Trade, Author's calculation.

The following table provides the approximate number of IECEE CB Scheme certificates issued worldwide for televisions.

Table 3-4 Approximate numbers of IECEE CB Scheme Certificates for Televisions 2006-2009

	2006	2007	2008	2009
Certificates	3054	3110	2907	3003

Source: Author's calculation

An attempt was made to count the factory locations for each of the above certificates in order to make the information more APEC relevant. However the usefulness of the results is questionable. A factory may be counted multiple times if it is listed on several certificates, and as such the count of factory locations can be significantly inflated due to double-counting. Certificates are issued for a specific model of device or component and each certificate can cover one or more production locations. Also there is also no differentiation for the size of the factory or how much actual production is undertaken in a specified location. Manufacturers may switch location of manufacture to respond to changing market forces.

Intra-APEC exports of televisions increased over the period from USD 30,381 million of exports in 2005 to a high of USD 43,995 million in 2008 (an increase of 44.8 % or 13.1 % p.a.). In 2009 a 14.6 % drop in exports by value was experienced, in line with global trends which are assumed to reflect the global financial crisis (see table 3.3).

For world total, APEC exports of televisions increased over the period from USD 39,104 million of exports in 2005 to a high of USD 54,138 million in 2008 (an increase of 38.4 % or 11.5 % p.a.). In 2009 a 13.8 % drop in exports by value was experienced.

The number of test certificates issued for televisions has remained stable at around 3000 per annum from 2006-2009 (see table 3.4). It is understood this reflects the current medium to long term product life cycle for televisions, which has been going through an innovation period as technologies have moved away from traditional cathode ray tubes into flat screens, LCD and Plasma televisions, etc.

This study has been unable to investigate changes in the costs of compliance for exporters of televisions, and to link this with the alignment program of the SCSC.

The trends show an increasing value of exports within the APEC region in televisions, with the exception of 2009, which is understood to be an aberration in the underlying trend. While this trade has increased, the number IECEE CB certificates issued per annum for televisions has not changed significantly.

3.4. ANALYSIS ON KPI 4

The following tables show the value of electrical and electronic product exports for each APEC member economy, intra-APEC trade and the World from 2005 to 2009. Figures in the UN Comtrade database for 2010 were not complete for all economies at the time of the research so the period 2005-2009 is provided.

Also included is the count of IECEE CB issued and recognized test certificates. Under the IECEE CB Scheme, Certification Bodies that are signatories to the scheme issue test certificates for products that conform to relevant IEC standards (see Appendix 1). These test certificates can then be utilized by manufacturers directly to enable market access of their products, or they may seek to have these certificates formally recognized by other certification bodies that are also signatories to the scheme.

Recognised test certificates are the number of issued test certificates that have formally been recognised by other certification bodies, mostly in other economies, and in which case retesting is not required. It is noted that "recognition" means recognition by the National Certification Body under the IECEE CB Scheme in the respective economy. IECEE CB certificates are also recognised by other private certification bodies or regulators in the importing economies. This type of recognition is not reported to the IEC Secretariat. For example, in Australia, only SAI Global will report recognised IEC CB certificates, the regulators (NSW Office of Fair Trading, etc.) will not do so, although the CB certificate plus CB report will be recognised and will lead to Australian approval without further testing.

In reviewing the statistics available on the IECEE CB website (http://www.iecee.org/cbscheme/html/cbstats.htm) the following data can be collated. Also included are some illustrative graphs of similar data over a longer time period and by product categorisation under the IECEE CB Scheme.

For intra-APEC trades, the value of exports from APEC member economies in electrical and electronic products, including the specific product of televisions, increased by 23.4% (around 7.2 % p.a.) during the period 2005 to 2008, and then reduced by approximately 13.3% in 2009. This reduction in 2009 is understood to be associated in the contraction in consumer spending due to the global financial crisis (see table 3.5).

For world total, the value of exports from APEC member economies in electrical and electronic products, including the specific product of televisions, increased by 27.8% (around 8.5 % p.a.) during the period 2005 to 2008, and then reduced by approximately 14.5% in 2009.

The growth experienced in APEC economy exports by value of electrical and electronic products before 2009 was in line with global trends, with APEC economies contributing consistently to approximately 66%-69% of total world exports.

There have been an increasing number of certificates issued and recognized for products under the IECEE CB Scheme. The proportion of the number of certificates issued by certification bodies from APEC member economies has remained stable, being just below half of the total number of certificates issues worldwide.

Similarly the number of issued certificates that are recognized in APEC member economies has increased over the 2006-2010 period, and proportionally has increased slightly from 45% to 55% of the total recognized certificates in the world (see table 3.6). This means APEC economies are using the recognition mechanism of the IECEE scheme to a greater extent than in the past.

With the increase in the number of certificates issued, and the increasing number of recognized certificates, APEC member economies are relying on conformity assessment

work undertaken by IECEE CB Scheme certification bodies in other economies and parts of the world. This is appropriate and in line with the intent of the VAP, which is to reduce the degree of duplicate standards and testing in the trade of electrical and electronic products.

The above analysis shows that the volume of trade in electrical and electronic products has generally increased since 2005 (with the exception of 2009). The number of test certificates issued and recognised under the IECEE Scheme has also increased over the same period.

This increased use of the IECEE CB Scheme is in line with the intent of the VAP program and also demonstrates an increasing use in APEC member economies of an international conformity assessment scheme, as is encouraged in the WTO TBT Agreement.

Table 3-5 Value (USD) of exports of electrical and electronic products (HS codes (02) 8418 Refrigerators, 8450 Washing machines, 8471 Computers, 8443 Printers, 85 Electrical and electronic equipment), inflation adjusted – 2009 prices

APEC member economy	2005		2006		2007		2008		2009	
	Intra APEC	World	Intra APEC	World	Intra APEC	World	Intra APEC	World	Intra APEC	World
Australia	1,955,072,706	2,905,227,454	1,934,900,504	2,886,427,712	2,249,986,261	3,278,184,615	2,351,558,360	3,317,387,582	1,904,041,982	2,644,170,562
Brunei Darussalam	..	..	16,195,266	18,088,284	..	..	..	..	..	..
Canada	17,957,917,924	21,096,001,769	18,589,724,270	22,184,249,180	19,114,654,120	22,611,275,620	18,239,030,344	21,314,186,447	14,166,492,496	16,523,009,572
Chile	151,089,966	186,910,041	186,232,667	231,878,285	197,939,739	308,108,252	206,051,235	337,126,841	192,505,575	272,443,522
People's Republic of China	206,252,567,674	276,838,367,760	256,199,649,132	346,111,094,837	307,201,502,853	432,323,994,871	329,926,914,309	479,418,328,467	297,543,400,878	426,213,782,590
Hong Kong, China	119,137,668,558	125,539,277,336	135,985,175,579	141,422,281,903	158,057,626,311	164,272,424,799	161,038,521,740	172,708,077,321	150,563,108,478	158,373,259,425
Indonesia	8,276,001,588	10,202,272,653	7,728,606,198	9,764,184,269	7,691,837,112	9,756,021,811	7,986,927,936	10,347,010,279	7,558,141,394	10,262,360,933
Japan	112,629,791,952	145,140,564,170	115,409,930,973	146,722,412,200	125,859,502,289	162,606,938,923	124,367,744,037	162,727,539,530	97,710,650,915	123,838,036,588
Korea	71,769,683,907	101,493,708,756	75,901,888,887	103,113,476,395	81,104,761,665	108,260,147,935	81,460,067,997	106,871,732,623	75,082,138,908	95,760,709,202
Malaysia	56,538,232,788	68,410,033,350	56,966,798,113	70,696,234,204	56,057,748,484	69,626,647,211	53,775,945,245	66,081,069,980	46,065,877,738	56,972,552,978
Mexico	65,194,904,671	68,647,058,812	73,445,256,198	78,163,352,152	79,570,481,318	84,338,719,637	82,165,634,083	88,690,894,097	68,520,257,572	73,561,856,122
New Zealand	864,256,022	1,060,457,214	840,952,822	1,025,924,597	928,464,267	1,127,798,288	805,794,976	1,009,860,099	614,328,349	785,345,219
Papua New Guinea	..	..	..	..	..	..	..	..	..	..
Peru	74,230,120	85,836,291	29,806,681	53,359,087	36,431,259	82,962,624	49,560,415	104,046,696	54,012,590	101,668,496
Philippines	22,574,493,402	26,615,133,565	23,675,546,338	28,540,012,970	25,628,346,881	31,064,454,987	23,163,709,368	27,921,578,916	17,448,362,434	21,309,359,214
Russia	733,386,776	2,223,754,748	660,944,010	2,856,493,375	696,040,367	3,099,158,480	698,213,419	3,738,024,353	712,369,370	3,029,616,311
Singapore	90,320,381,950	112,163,806,340	103,553,413,872	126,103,423,880	120,063,052,446	144,045,698,551	107,924,797,773	128,355,730,854	89,626,639,821	104,213,186,858
Chinese Taipei	46,458,447,266	81,032,738,221	48,019,530,036	91,717,939,281	46,354,650,746	95,673,832,452	43,701,356,922	91,126,843,906	36,299,448,824	78,071,953,401
Thailand	26,388,869,468	33,265,370,185	29,995,406,921	37,910,902,117	33,355,355,787	41,973,314,529	32,894,383,013	42,314,247,185	28,428,977,459	36,854,968,260
United States	130,803,485,253	173,766,653,916	141,077,799,058	187,537,480,351	136,456,346,904	187,808,863,600	133,793,451,063	188,867,797,636	111,253,603,517	153,287,485,539
Viet Nam	1,849,395,820	2,159,304,806	2,439,027,611	2,927,753,011	3,579,997,555	4,390,022,642	4,285,916,765	5,267,604,606	4,570,870,310	5,653,780,170
APEC total	**979,929,877,811**	**1,252,832,477,388**	**1,092,656,785,138**	**1,399,986,968,090**	**1,204,204,726,363**	**1,566,648,569,828**	**1,208,835,578,999**	**1,600,519,087,419**	**1,048,315,228,610**	**1,367,729,544,962**
World total		**1,896,633,983,630**		**2,112,534,212,504**		**2,309,421,701,902**		**2,379,446,035,480**		**1,986,484,024,169**

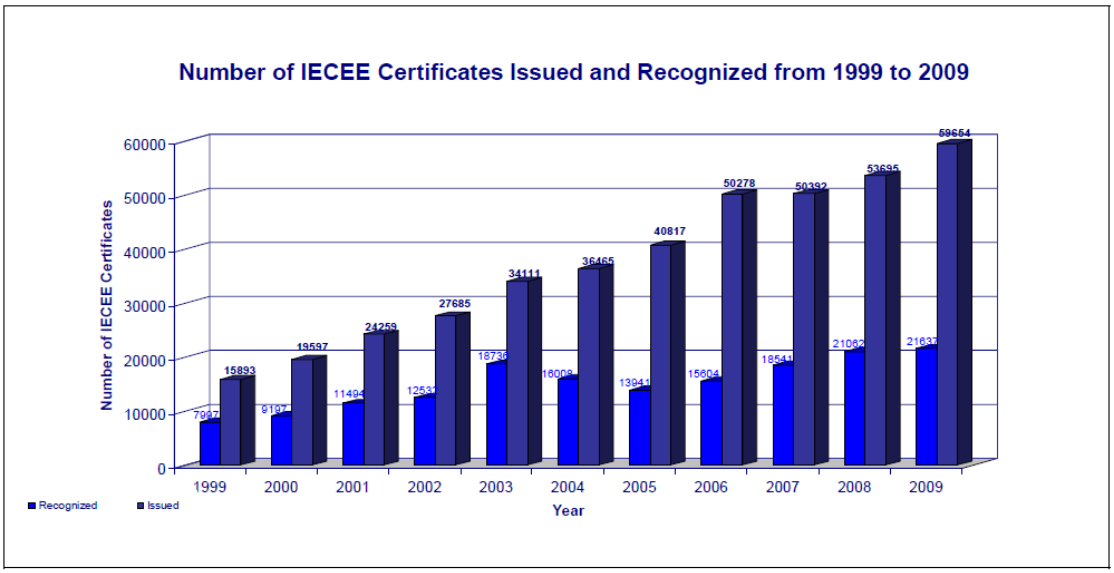
Note: Data for Brunei Darussalam are only available for 2006; Data for Papua New Guinea are not available; Data on Chinese Taipei as a trading partner, are the mirror data from Chinese Taipei's own reports. Due to availability, HS (1996) is used for Brunei (year 2006); Indonesia (year 2005, 2006, 2007, 2008, 2009); Philippines (year 2005, 2006); and, HS (2007) for Chinese Taipei (year 2009) as reporter and as partner of other economies. The World total exports might also not be an aggregate consistent with HS 2002. Source: UN Comtrade; Chinese Taipei Bureau of Foreign Trade, Author's calculation.

Table 3-6 Number of total IECEE Scheme CB Test Certificates and Recognized Certificates for all electrical and electronic products 2006-2010

Economy	Certification Body (CB)	2006 CBTC Issued	2006 Certificates Recognized	2007 CBTC Issued	2007 Certificates Recognized	2008 CBTC Issued	2008 Certificates Recognized	2009 CBTC Issued	2009 Certificates Recognized	2010 CBTC Issued	2010 Certificates Recognized
Australia	SAI Global	52	29	38	19	7	20	3	13	0	
Brunei Darussalam	N/A										
Canada	CSA International, ITS N.A., QPS Evaluation Services, Inc., UL Canada	1465	168	1260	104	1350	183	1214	195	1627	168
Chile	N/A										
People's Republic of China	CQC	2767	1811	2768	1574	3016	1885	3415	2629	3876	3248
Hong Kong, China	N/A										
Indonesia	SICS	N/A		N/A		N/A	0	0	0	3	0
Japan	JET, JQA, JP TUV, UL Japan	10985	297	10193	276	10721	290	11794	311	14440	365
Korea	KTR, KETI, KERI, KTL, NREC	1037	956	1022	998	1069	977	1071	1526	1314	683
Malaysia	SIRIM QAS	146	627	206	591	205	612	158	461	188	472
Mexico	ANCE	N/A	0	0	1	1	8	0	17	2	3
New Zealand	N/A										
Papua New Guinea	N/A										
Peru	N/A										
Philippines	N/A										
Russia	GOST Re	4	592	22	542	30	897	28	756	13	561
Singapore	Intertek Singapore, TUV SUD PSB	1073	2018	1159	5615	4110	5643	5537	5516	7100	4612
Chinese Taipei	N/A										
Thailand	TISI	N/A	0	0	12	0		0		0	
United States	ITS Intertek, MET Labs, TUV Rheinland, UL	3472	511	3889	1167	3973	1266	4027	1583	5194	1635
Viet Nam	N/A										
APEC total		**21001**	**7009**	**20557**	**10899**	**24482**	**11871**	**27244**	**13007**	**33757**	**11747**
World total		**50278**	**15604**	**50392**	**18553**	**53695**	**21062**	**59654**	**21593**	**71892**	**21162**

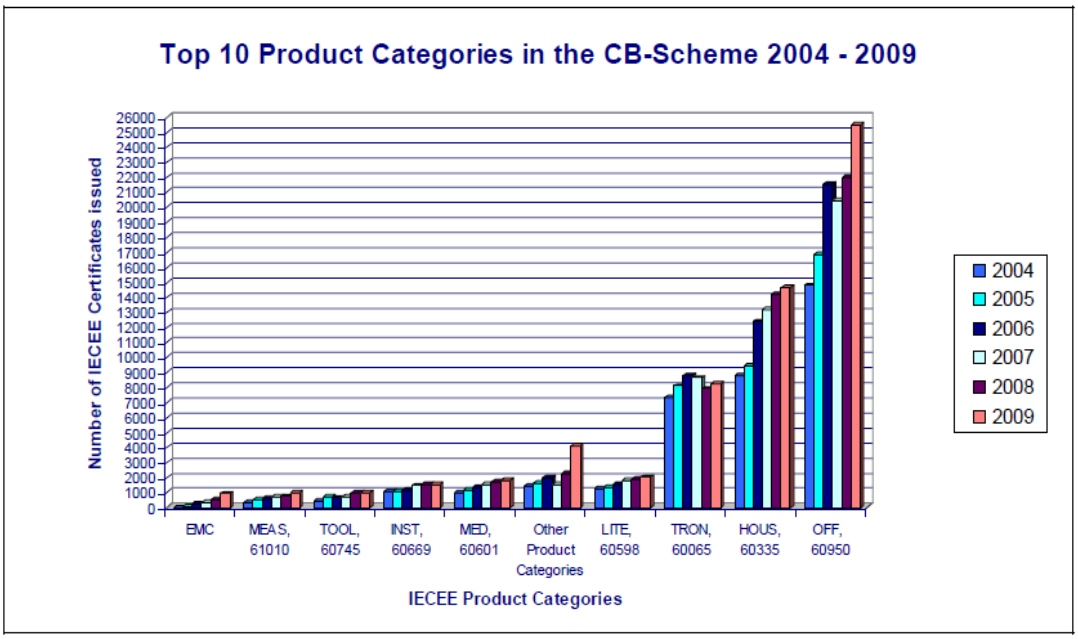
Source: Author's calculation

Figure 3-1 Number of IECEE Certificates Issued and Recognized from 1999 to 2009



Source: IECEE website.

Figure 3-2 Top 10 Product Categories in the CB-Scheme 2004 - 2009



Source: IECEE website.

4. CONCLUSIONS

In conclusion, the study has been able to address KPIs 1 and 2 which relate to the degree of alignment achieved by APEC member economies with relevant IEC standards. This has been achieved through the SCSC Voluntary Action Plans where specific international standards have been identified and APEC member economies have, over time, aligned their technical regulations and domestic standards.

The expectation is that by undertaking this alignment, manufacturers have a harmonised set of standards to comply with that increase certainty in the market place, and allow for economies of scale to be realised in production of products that meet the requirements of several markets.

Additionally, alignment of standards allows for test results to be recognised in other jurisdictions and there is a recognised international conformity assessment scheme which allows for this in the form of the IECEE CB Scheme. The APEC EEMRA recognises this scheme. Recognising test certificates that are produced by competent certification bodies reduces the need to retest products when they enter new markets. This has the overall effect of reduced trade transaction costs (i.e. costs of compliance) for exporters.

This study has not directly researched changes in costs of compliance faced by exporters as would be necessary for evaluation of KPIs 3 and 4. Instead it has identified for electrical and electronic products that there has been a consistent increase in the value of exports since 2005 (with the exception of 2009 assumed to be a result of the global financial crisis). During this same period the number of IECEE CB test certificates issued and recognised has also increased.

Overall these trends do contribute to the achievement of the Second APEC Trade Facilitation Action Plan (TFAP II), and they demonstrate APEC member economies' commitment to obligations in the WTO Agreement on Technical Barriers to Trade in relation to the use of international standards and international conformity assessment schemes to facilitate trade.

This project has highlighted the research difficulties in evaluating KPIs that have been adopted retrospectively. In the future KPIs should be established prior to the reporting period commencing. In their formulation they should be widely discussed, including the reporting methodology that needs to be put in place and maintained to provide meaningful data. In achieving this outcome existing reporting activities should be considered as part of this process.

Specific recommendations for each KPI are as follows:

KPI 1: In terms of future research, it is noted this KPI was difficult to initially understand. Its connection with the overall goal of reducing trade transaction costs in TFAP II is not explicit.

KPI 2: Future research in this area could focus on the reasons for non-reporting by some APEC member economies, and whether new standards may now become the focus for alignment through the VAPs.

KPIs 3 and 4: Future research is needed in the changes to the costs of compliance due to alignment with IEC standards for electrical and electronic products and through the greater recognition of issued certificates of compliance to avoid duplicate testing and other compliance costs.

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GLOSSARY

Many of the terms in this report are defined in ISO/IEC 17000:2004, *Conformity assessment - Vocabulary and general principles*. The following glossary draws upon the definitions in that standard.

attestation

issue of a statement, based on a decision following review, that fulfilment of specified requirements has been demonstrated

certification

third-party attestation related to products, processes, systems or persons

conformity assessment

demonstration that specified requirements relating to a product process, system, person or body are fulfilled

Note 1: The subject field of conformity assessment includes activities such as testing, inspection and certification as well as the accreditation of conformity assessment bodies.

declaration

first-party attestation

first-party conformity assessment activity

conformity assessment activity that is performed by the person or organization that provides the object

second-party conformity assessment activity

conformity assessment activity that is performed by a person or organization that has a user interest in the object

Note 2: Persons or organizations performing second-party conformity assessment activities include, for example, purchasers or users of products, or potential customers seeking to rely on a supplier's management system, or organizations representing those interests.

third-party conformity assessment activity

conformity assessment activity that is performed by a person or body that is independent of the person or organization that provides the object, and of user interests in that object

inspection

examination of a product design, product, process or installation and determination of its conformity with specific requirements or, on the basis of professional judgement, with general requirements

sampling

provision of a sample of the object of conformity assessment, according to a procedure

testing

determination of one or more characteristics of an object of conformity assessment, according to a procedure

ABBREVIATION LIST

APEC	Asia Pacific Economic Cooperation
APLAC	Asia Pacific Laboratory Accreditation Cooperation
BIPM	Bureau International des Poids et Mesures / International Bureau of Weights and Measures
CIPM	Comité International des Poids et Mesures / International Committee for Weights and Measures
EEMRA	APEC Electrical and Electronic Equipment Mutual Recognition Arrangement
IAF	International Accreditation Forum
IEC	International Electrotechnical Commission
IECEE CB Scheme	IEC Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components
ILAC	International Laboratory Accreditation Cooperation
ISO	International Organization for Standardization
ISO/CASCO	ISO Committee on Conformity Assessment
ITS	International Trade Strategies Pty Ltd
KPI	Key Performance Indicator
MRA	Mutual Recognition Arrangement/Agreement
OECD	Organisation for Economic Co-operation and Development
OIML	International Organization of Legal Metrology
PSU	APEC Policy Support Unit
RFP	Request for Proposal issued by the APEC Policy Support Unit for *The contribution of standards and conformity assessment measures in reducing trade transaction costs in APEC*, November 2010
SCSC	APEC Subcommittee on Standards and Conformance
SITC	Standard International Trade Classification, Revision 3
TBT	WTO Agreement on Technical Barriers to Trade
TFAPII	APEC's Second Trade Facilitation Action Plan
VAP	Voluntary Action Plan
WTO	World Trade Organization

APPENDIX 1 IEC STANDARDS USED IN THE IECEE CB SCHEME

(as at 22 December 2010)

There are 20 product categories and 273 top-level standards covered under the IECEE CB Scheme. Some of these top-level standards have as many as 200 individual parts, and amendments.

Categories	Products	IEC Standards
BATT	Batteries	60086, 60095, 60099, 60254, 60571, 60622, 60623, 60783, 60785, 60896, 60952, 61133, 61809, 61951, 61960, 61982, 62133, 62257, 62259, 62281, 62282,
CABL	Cables and Cords	60227, 60245, 60502, 60702, 61316,
CAP	Capacitors as components	60252, 60384, 60939, 61048, 61049,
CONT	Switches for appliances and automatic controls for electrical household appliances	60255, 60691, 60730, 60934, 61095, 61508, 61810,
EMC	Electromagnetic Compatibility	60034, 60118, 60204, 60255, 60533, 60601, 60728, 60870, 60945, 60947, 60974, 61000, 61131, 61204, 61326, 61543, 61547, 61800, 61812, 62040, 62041, 62052, 62053, 62054, 62153, 62233, 62236, 62311, 62493, CISPR 11, CISPR 12, CISPR 13, CISPR 14, CISPR 15, CISPR 16, CISPR 20, CISPR 22, CISPR 24, CISPR 25, CISPR/TR 16,
HOUS	Household and similar equipment	60204, 60311, 60312, 60335, 60342, 60350, 60436, 60456, 60530, 60580, 60661, 60704, 60705, 60730, 60967, 61011, 61121, 61591, 61770, 61817,
HSTS	Hazardous Substances Testing Service	62321,
INST	Installation accessories and connection devices	60083, 60282, 60309, 60320, 60364, 60423A, 60423, 60614, 60669, 60670, 60684, 60799, 60807, 60884, 60974, 60998, 60999, 61058, 61076, 61084, 61210, 61238, 61242, 61316, 61386, 61534, 61535, 61537, 61800, 61950, 61984, 61995, 62094, 62103, 62196, 62208, 62444, CEE,
LITE	Luminaires	60064, 60081, 60155, 60238, 60360, 60400, 60432, 60570, 60598, 60838, 60901, 60921, 60923, 60925, 60927, 60929, 60968, 60969,

		61047, 61048, 61049, 61050, 61184, 61195, 61199, 61228, 61347, 61549, 62031, 62035, 62257, 62384, 62471,
MEAS	Measurement, Control and Laboratory equipment	60414, 61010, 61131, 61204, 61557,
MED	Electrical equipment for medical use	60601, 60613, 60976, 61223, 61676, 62220, 62353, 62366, 62462, 62467, 62563, 80601,
MISC	Miscellaneous	60077, 60515, 60747, 60768, 60800, 60825, 60846, 60900, 60938, 61318, 61340, 61482, 62257, 62386, 62395, 62471,
OFF	IT and office equipment	60950, 61204, 62040, 62310,
POW	Low voltage, high power switching equipment	60158, 60439, 60947, 61439, 61851, 62019, 62026, 62314,
PROT	Installation protective equipment	60127, 60257, 60269, 60898, 61008, 61009, 61540, 61643,
PV	Photovoltaics	60891, 60904, 61194, 61215, 61345, 61646, 61702, 61721, 61727, 61730, 61829, 62093, 62108, 62109, 62124, 62257, 62446, PVRS 5A, PVRS 7A, PVRS11A, PVRS11, PVRS5, PVRS6A, PVRS6, PVRS7,
SAFE	Safety transformers and similar equipment	60044, 60704, 60742, 61558,
TOOL	Portable tools	60745, 61029, 61939,
TOYS	Electric Toys	62115,
TRON	Electronics, entertainment	60065, 60491, 61204, 61965,