

Parker

## Utilisation of ISO9806:2017 in Global Solar Certification

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### Abstract

In order to promote international sales of high-quality solar heating technology a Global Solar Certification Network has been initiated by the International Energy Agency Solar Heating and Cooling Programme (IEA SHC) A global solar certification scheme relies on the broad adoption of relevant international standards. In 2014 a survey was carried out to ascertain the likelihood of adoption of ISO 9806:2013 *Solar energy - Solar thermal collectors – Test methods* internationally, as well as canvassing for any recommended changes. The results informed the revision of that standard, culminating in ISO 9806:2017. This study reports on a comprehensive survey to investigate the test methodologies currently employed internationally, likelihood of adoption of ISO 9806:2017, recommended changes to improve the standard, and the response to changes made to the standard. 84 valid responses from 35 countries were received and indicated an increase in adoption of ISO 9806 since 2014, recommended changes such as editorial corrections, some additional test requirements needed, and the inclusion of large, concentrating, polymeric or PVT collectors. Eleven of thirteen respondents who expressed concerns with the standard in the previous survey were satisfied their concerns had been addressed in the latest version. There has been increased adoption of ISO9806 and respondents indicate that this will be further taken following the 2017 revision.

### 1. Introduction

**Global Solar Certification Network.** To access international markets, solar thermal manufacturers need to test and certify their products to the local national standard. The Global Solar Certification Network (GSCN) assists manufacturers to save time and money by completing several certification processes based on completing only one set of tests (GSCN, 2018) (Solar Thermal Energy Council, 2018). The GSCN has decided that ISO 9806 is the appropriate standard to be used for solar collector certification. The standard was originally published in 1994 as a global standard. It was updated in 2017 with many of the changes as a result of a 2014 study (Guthrie, et al., 2014). ISO 9806 is currently the standard used by the European Committee for Standardization (CEN). The CEN comprises of 34 countries, including member states of the EU, the Former Yugoslav Republic of Macedonia, Serbia, Turkey, Iceland, Norway and Switzerland (European Committee for Standardization, 2018).

This study used a survey to understand the current national testing methodologies and the likelihood that ISO9806 would be adopted. The survey was distributed globally to persons that are involved in the development of their countries' solar standards. A similar survey was conducted in 2014 as part of IEA SHC Task 57 and informed amendments made to ISO 9806:2013 to update the standard to ISO 9806:2017. This study also asked respondents for comments that would improve the standard, these will be incorporated into any future changes.

Therefore, the research questions for this study are

1. Is it likely that countries outside Europe will take up the new standard?



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2. Are there any improvements required for countries to take adopt it?
3. Are there any other improvements that may be necessary or desired to improve the Standard? This question was relevant for all countries including European countries.

## **2. Methodology**

The survey was opened on the 26<sup>th</sup> of July 2018 and closed on the 3<sup>rd</sup> of September 2018 . On September 10 the survey was reopened and representatives from particular countries were approached for responses to fill specific gaps. The survey was finally closed on October 15. Qualitative and quantitative analysis was performed on the survey responses.

A snowball sampling approach was used to disseminate the survey. The respondents initially invited to complete the survey were comprised of the mailing list for TC180 “Solar Energy” committees and subcommittees, and the International Energy Agency Solar Heating and Cooling program (Weiss & Spörk-Dür, 2018). They were asked to pass on the survey to other relevant contacts.

The survey requested the country the respondent represented and where this was not given, the IP address of the respondent was used to geo-locate where the form was completed.

Of particular interest to the survey were countries outside the CEN that may adopt ISO 9806 and have a reasonable share of the world’s solar market. A list was compiled for the 2014 survey that totalled 16 countries, which was used again for this study to maintain consistency. These countries in order of market share are; China, Brazil, India, Australia, United States, Israel, Mexico, Japan, South Africa, Canada, Taiwan PoC, Tunisia, Jordan, Lebanon, South Korea and Barbados. The responses from these 16 countries and comparison to the 2014 results are the focus of this paper.

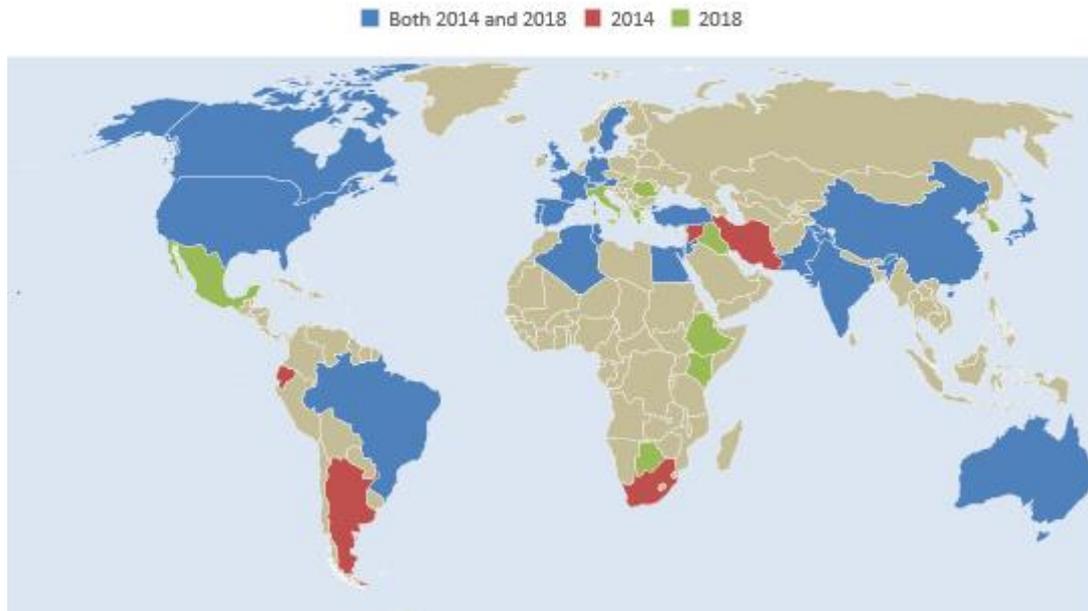
## **3. Results**

### **3.1. Responses**

The survey received 84 usable responses from 35 countries from respondents who indicated that they were able to comment on the uptake of ISO 9806 in their country. Of these 35 countries 25 had mirror committees to ISO TC 180 and 42 respondents were members of those committees.

Of these usable responses, 13 of the 16 “target countries” were represented. Of the target countries, only Taiwan PoC, Lebanon and South Africa did not have provide responses. An estimated 94% of the world’s market (Weiss and Spörk-Dür, 2018) was represented. Figure 1 shows the countries of respondents to the 2014 survey, the 2018 survey, and both surveys.

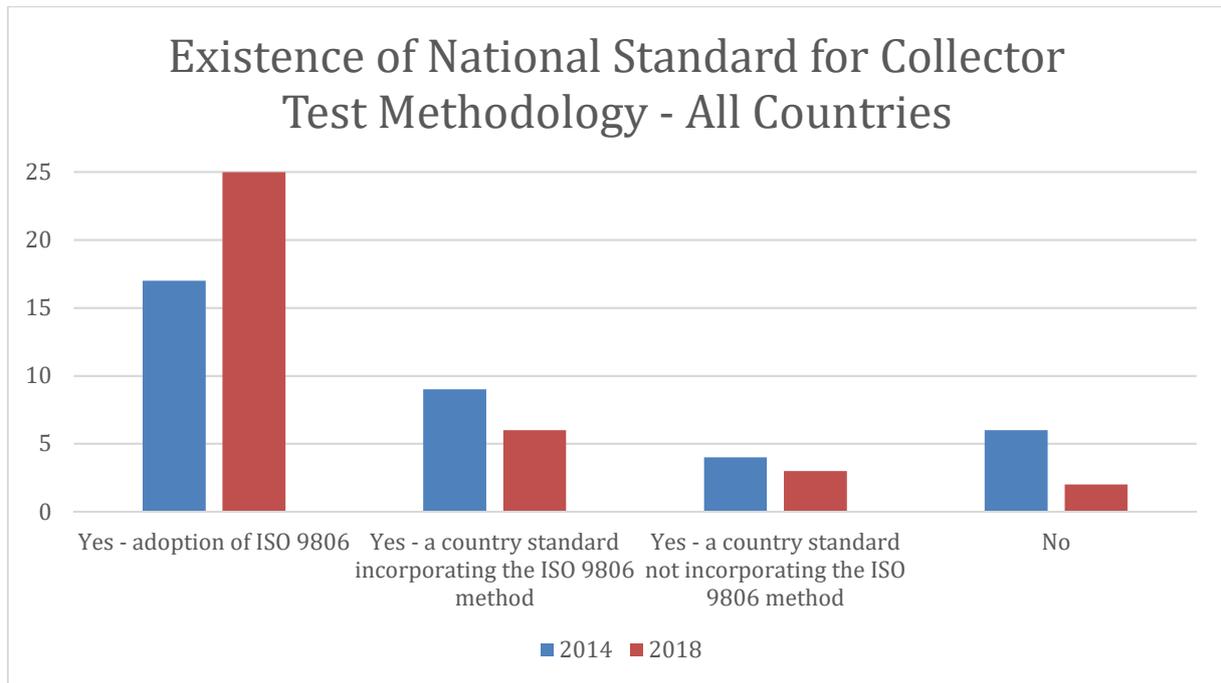
## Countries Who Responded by Year



**Figure 1 - Countries with a response recorded, by year**

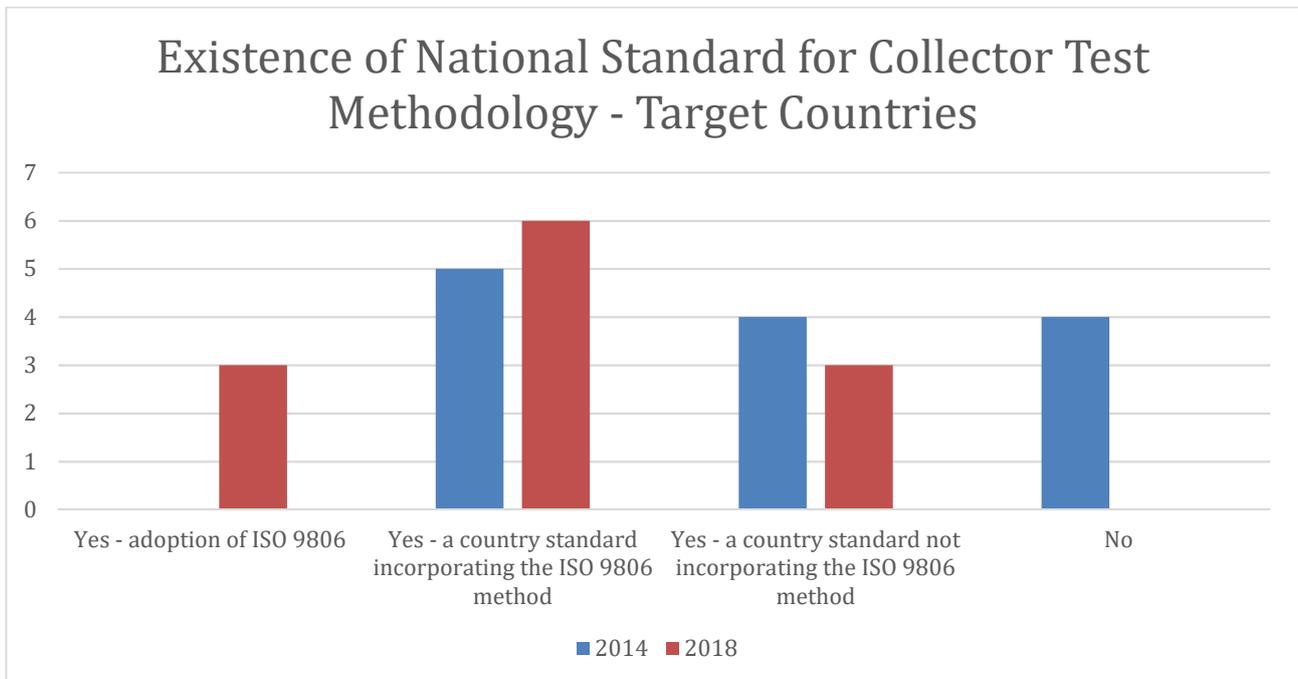
### **3.2. National Standard for Collector Test Methodology**

One survey question was designed to ascertain the current use of national standards of solar collector test methodologies. This question was also asked in the 2014 survey and provides a comparison. 25 countries now use ISO 9806 as their national standard, compared to 17 in 2014, and a further nine countries have national standards that incorporate the same method as ISO 9806, compared with six in 2014 (Figure 2).



**Figure 2 - Existence of national standard for collector test methodology - all countries**

Three of the target countries now use ISO 9806 compared with zero in 2014, and a further six incorporate the same methods in a national standard, as opposed to five in 2014 (Figure 3). All target countries from whom a valid response was received now use some form of national standard for solar collector test methodology.



**Figure 3 - Existence of national standard for collector test methodology - all countries**

### 3.3. Likelihood of Adoption

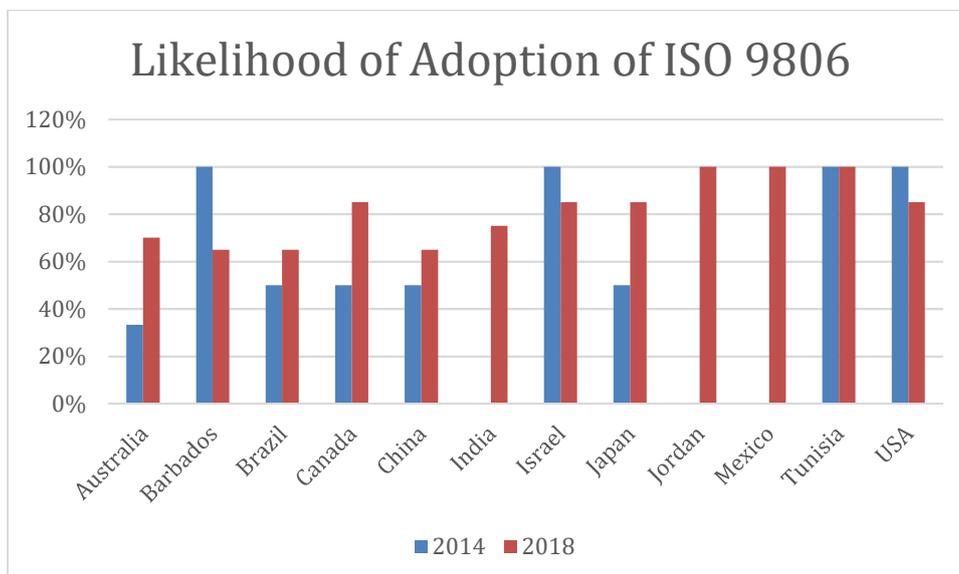
One of the key results expected of the survey is to develop an understanding of how likely it is that ISO 9806:2017 will be adopted.

**2014 survey.** To calculate the likelihood of uptake of ISO 9806:2013, respondents to the 2014 survey were asked: *“Is it likely that your country will take up ISO 9806:2013 as a National Standard or recognize it for purposes such as Regulations and/or Certification?”*. Respondents were given four options to answer, “Yes”, “No”, “Not sure” or “Don’t know”. “Yes” was given a weighting of 1, “No” a weighting of 0, “Not sure”, 0.5 and “Don’t know” responses were removed from the analysis. Once the results were tallied a weighted average was calculated for each country.

**2018 survey.** To calculate the likelihood of uptake of ISO 9806:2017, respondents to the 2018 were asked: *“How likely is it that your country will take up ISO 9806:217 as a National Standard or recognise it for purposes such as Regulations and/or Certification?”*. Respondents were given six options to answer, “Very likely”, “Somewhat likely”, “Neither likely nor unlikely”, “Somewhat unlikely”, “Very unlikely”, and “Unsure”. Countries that had already adopted the 9806:2017 as a national standard were deemed 100%. Very likely was considered to be 85% likely that the standard would be adopted, somewhat likely was considered 65%, neither likely nor unlikely 50%, somewhat unlikely 35%, and very unlikely 15%. When countries received multiple answers, the mean average was taken for that country. Answers of unsure were not considered in the analysis.

The results, as represented in Figure 4, show:

- No valid response to this question was recorded from South Africa or Taiwan PoC in either the 2014 or the 2018 survey.
- There has been a general trend in an increase in the likelihood of adoption of ISO 9806 as a national standard across the target countries. Notable exceptions are Barbados and USA. Note that changes in the analysis methodology between 2014 and 2018 has led to minor variations in percentage likelihood as shown in Figure 4.

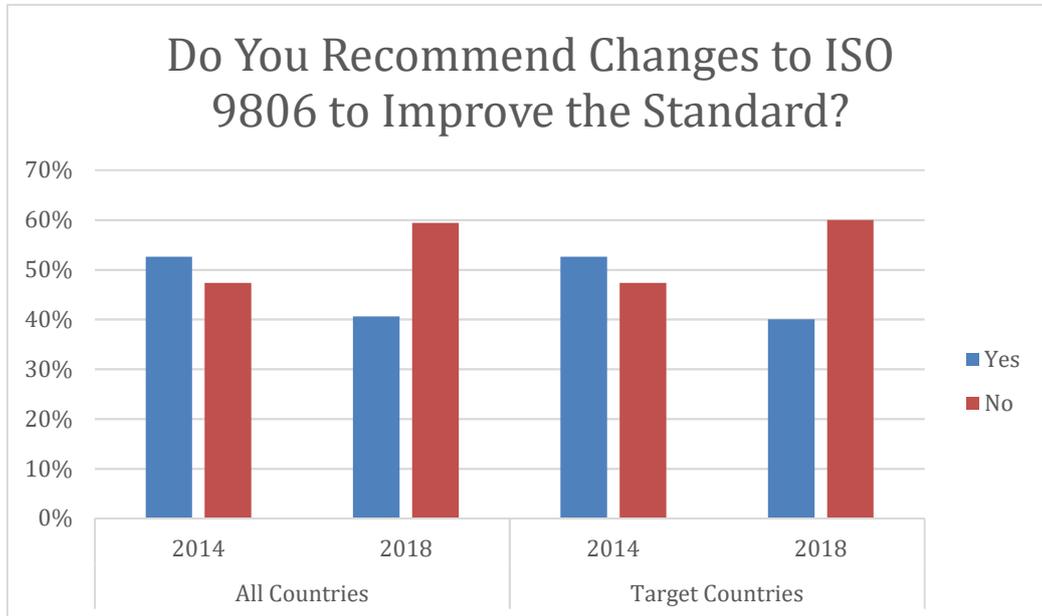


**Figure 4 - Likelihood of adoption of IO 9806 as a national standard for solar collector testing - target countries**

### 3.4. Proposed Changes to Improve the Standard

To see if changes were required for their country to adopt the standard, respondents were asked about any possible improvements. For the 2014 survey a total of 38 responses were recorded from

all countries. As a percentage of total respondents, fewer total and target countries recommended changes to improve the standard (Figure 5).



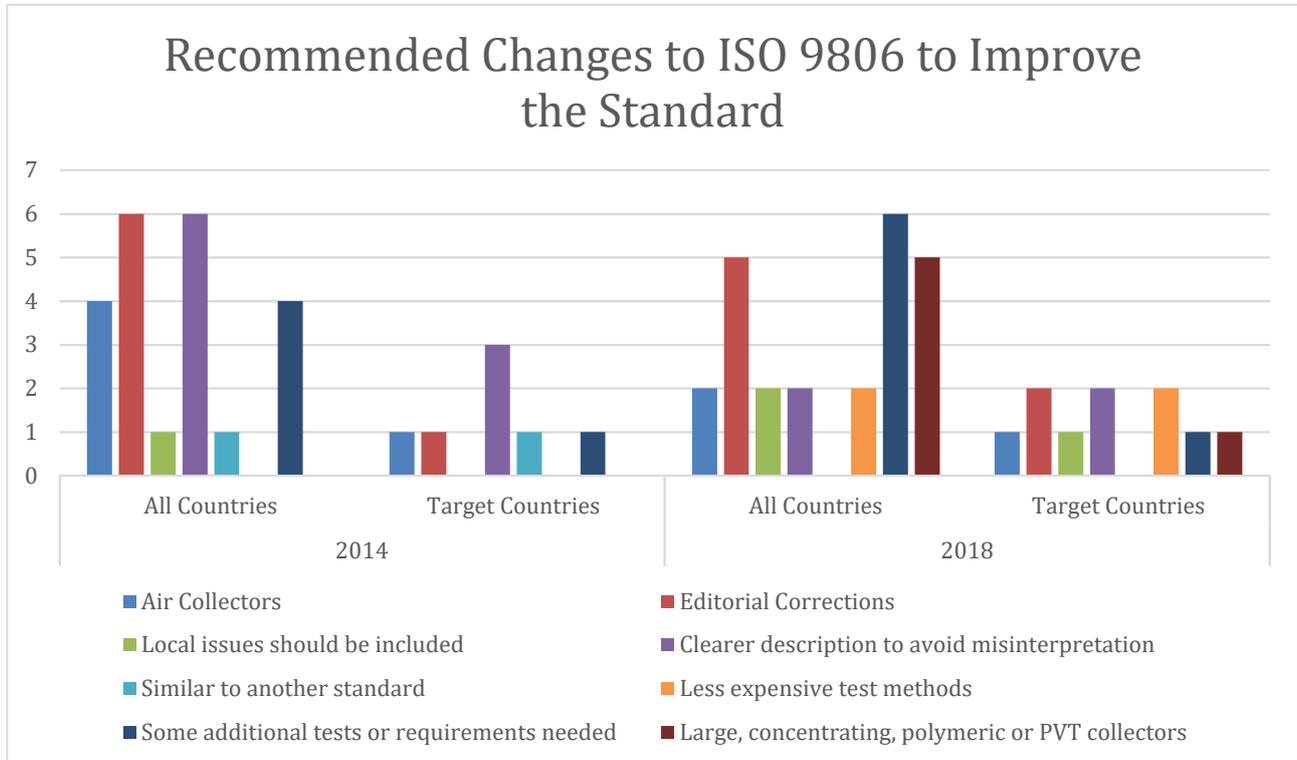
**Figure 5 – Are there any recommended changes that could improve the standard**

Questions were also designed to ascertain what changes respondents recommended to improve the standard. In 2014 respondents were asked the open-ended question “*Are there any changes to ISO 9806 that you consider would improve that Standard?*”. Responses were then categorised into six categories.

In the 2018 survey, respondents were asked “*What changes to ISO 9806 that you consider would improve that Standard?*”. Most responses could be categorised by the response options offered in the 2014 survey. Two additional categories were needed.

The more prominent suggestions in 2014 were air collectors, editorial corrections, clearer description to avoid misinterpretation and some additional test requirements needed. The more prominent suggestions in 2018 were editorial corrections (different corrections to 2014), some additional test

requirements needed and increase the types of collectors covered by the standard (large, concentrating, polymeric or PVT collectors) (Figure 6).

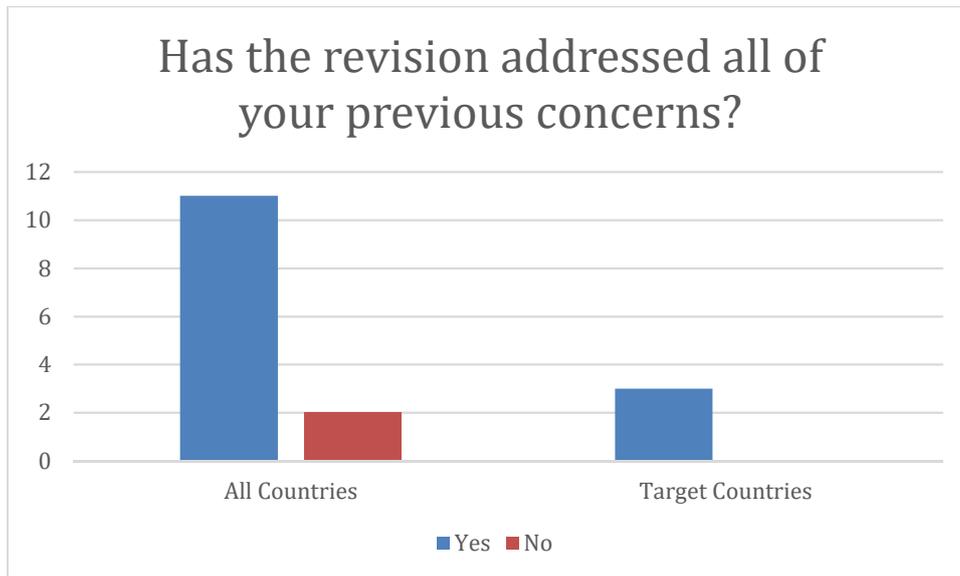


**Figure 6 - Recommended changes to the standard**

### 3.5. Response to Changes Made as a Result of the Previous Survey

Revisions to the standard were made following the 2014 survey taking into consideration respondents' responses and recommendations. The 2018 survey also sought to ascertain the level of satisfaction of respondents to the changes made as a result of their feedback. In the 2018 survey, respondents were asked "Have you provided feedback on a previous survey on ISO 9806:2017?". Those who had were then asked, "Has the revision addressed all of your previous concerns?".

Of the 14 who responded yes to the first question, 11 responded that the changes did address their concerns, two responded that they did not, and one did not specify. Three responses from target countries were recorded, all indicating that the revision had addressed their previous concerns (Figure 7).



**Figure 7 - Has the revision addressed all of your previous concerns?**

#### **4. Discussion**

##### **4.1. Responses**

The total number of valid responses for the 2018 survey was 84, compared with 63 from the 2014. 42 of these responses came from members of mirror committees in their respective countries. This indicates that the responses received were generally from persons that had a good understanding of the solar thermal market, standards, and test methodologies currently employed in their country.

Thirteen of the sixteen target countries were represented in the 2014 survey. These countries were Australia, Barbados, Brazil, Canada, China, India, Israel, Japan, Jordan, South Africa, Taiwan PoC, Tunisia and the USA. The same number was represented in the 2018. There was no response received from South Africa or Taiwan PoC in 2018, and South Korea and Mexico responded in 2018 despite not responding in 2014. This is a pleasing response as it covers many of the key markets.

##### **4.2. National Standard for Collector Test Methodology**

Of the countries for which we received responses, there has been an increase in the number using ISO 9806 as their national standard from 17 in 2014 to 25 in 2018. There has also been an increase in the number of countries who incorporate ISO 9806 test methods into their national standard from six to nine. Despite the number of countries represented in the response data increasing, the number of countries without a national standard for solar collector testing methodology has decreased from six to two. Four of the 13 target countries represented in the 2014 survey did not have a national standard, all 13 target countries now do.

##### **4.3. Likelihood of Adoption**

Three countries have adopted the standard since 2014; Jordan, Mexico and Tunisia. In the 2014 survey, no valid responses were received from Jordan or Mexico to indicate their likelihood of adoption. The 2014 response from Tunisia indicated a high likelihood, which has been validated by their adoption of the standard.

In the 2014 survey, one valid response from Barbados indicated that it was likely that the standard would be adopted. In the 2018 survey, two responses indicated that adoption was somewhat likely. Israel recorded the highest possible response in both the 2014 and 2018 survey. For both of these

countries, changes in likelihood is due to the change in the number of responses available to the survey question.

The USA has recorded a significant decrease in likelihood of adoption. This can be explained by one response stating that “*SRCC Standard 100 would have to be abandoned/withdrawn*” in order for the ISO9806 to be adopted. SRCC 100 is the Solar Rating and Certification Corporation Thermal Collector Standard and it references and is consistent with ISO9806 (SRCC, 2018).

The latest information from the USA indicates that SRCC 100, which is the Solar Rating and Certification Corporation Thermal Collector Standard will incorporate ISO9806 and this will flow through to Canada and Mexico in due course.

Australia, Brazil and Canada all recorded an increase from the 2014 survey and no response data indicated a barrier to adoption. All three countries currently use national standards that incorporate ISO9806 methodologies. This indicates that national standards are increasingly harmonised with ISO 9806 which is a positive indication for widespread use of a global certification scheme.

No valid response to this question was recorded from India in 2014 and in 2018 survey responses indicate a high likelihood of adoption. Japan had four responses in 2014 all indicating that they weren't sure if their country would adopt ISO9806. In 2018, the one response was recorded from Japan indicating that they were very likely to adopt the standard. Both India and Japan have local standards that do not incorporate ISO9806 methodologies.

Following the questionnaire we approached colleagues in China and received an additional response noting that a proposal has been made to the China National Institute of Standardisation to translate and adopt ISO9806. This indicates a strong likelihood that ISO9806 will be adopted in China. This is significant as China does not currently incorporate ISO9806 as part of its national standard and it makes up 76% of the global solar thermal collector market (Weiss & Spörk-Dür, 2018).

#### **4.4. Proposed Changes to Improve the Standard**

The most common changes recommended in the 2014 survey related to air collectors, editorial changes, clearer description to avoid misinterpretation, and additional tests and requirements. In the 2018 survey, the more common recommendations related to editorial changes, additional tests and requirements, and coverage of newer collector technologies.

This suggests that changes made after the 2014 survey addressed concerns relating to air collectors and clarifications in the standard. Whilst editorial issues were addressed as a result of the previous survey, new editorial issues were noted, and additional testing and requirements remain a concern.

Of the thirteen who responded to the 2014 survey, eleven expressed that changes made to the 2013 standard addressed their concerns, including three from target countries. This indicates that the survey in 2014 was an effective way to gather comments of what changes were needed and that the revision captured most of those changes recommended.

## **5. Conclusion**

In order for a Global Solar Collector Certification scheme to be delivered a widely adopted International Standard or harmonised national standards are required. ISO 9806:2017 *Solar energy - Solar thermal collectors - Test methods* is proposed to be the basis of a global scheme.

The 2014 survey found that changes to ISO 9806:2013 were required to encourage wider adoption and the standard was updated accordingly resulting in ISO 9806:2017. Responses to the 2018 survey represent countries comprising approximately 94% of the international solar thermal market from respondents with solid understanding of their countries' solar thermal markets, standards, and testing methodologies.



The changes to ISO 9806:2013 that were made in the 2017 revision have improved the standard, and of those who responded to both surveys, the majority are satisfied with these changes.

There has been an overall increase in adoption of the standard and an increased likelihood of adoption from some of the countries who have not already done so. However further consideration needs to be given to incorporate new solar heating technologies.

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