

# Asia-Pacific

## SKILLS MAPPING PROJECT

Final Report  
September 2008



*skills and labour market specialists*



Australian Government

Department of Education, Employment  
and Workplace Relations





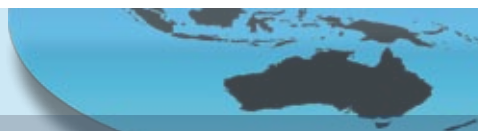


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This report has been produced with the assistance of funding from the Department of Education, Employment and Workplace Relations through the National Skills Shortages Strategy. However, the views expressed in the report do not necessarily represent the views of the Minister for Education, Employment and Workplace Relations.

It should also be noted that this report was compiled over an eighteen month period with the extensive assistance of a range of agencies, including government, industry and non-government, both within Australia and in each country or territory. Their support for the project is appreciated. The information outlined is presented as correct at the time of publication but this area is ever changing due to continual shifts in public policy and government and industry practices. In some cases not all information was available, or in some cases the latest information was used in circumstances where changes were projected by industry or government agencies. As such, it is important to contact each government to validate the data in the future.



## NECA PRESIDENT'S MESSAGE

NECA took on the challenge of providing leadership on behalf of our industry for examining the emerging skills shortages and increased labour mobility being experienced across the Asia Pacific region in mid 2006. Such a comprehensive comparison across a range of countries on one important qualification had never been undertaken by industry in the trades and vocational education and training sector before.

Many sceptics warned us that it would be a very difficult exercise and they were right. The key to our success has been the involvement and leadership by industry through the regional industry peak bodies: the Federation of Asian and Pacific Electrical Contracting Associations (FAPECA) and the ASEAN Federation of Electrical Engineering Contractors (AFEEC). I thank both organizations and in particular their member organizations for the thousands of hours they have each contributed to making the collection of reports and this final summary possible.

It is also important to clarify why NECA was so keen to undertake such a momentous task. The primary motivation is not about increasing skilled migration in Australia, although the movement of skilled people around our region is increasing and this will assist in providing a potential framework to facilitate movement. It has the main goal of lifting the standard and skills acquisition of all workers across the region and attempting to secure an agreement on the skill set it requires to be an electrician in any participating country. It also recognises that all jurisdictions have some regulatory arrangements which significantly differ and these need to be acquired by any worker entering that labour market and operating in our industry. We hope that FAPECA and AFEEC can go the next step and agree on the precise competency or skills framework based on this work.

We also insisted on examining each country's or territory's education and training systems and structures, including quality assurance mechanisms, to determine the extent we can assess, from an industry perspective, that we were comparing qualifications on a level playing field. We did not take the view that Australia's system was the benchmark as we discovered some of our regulations and arrangements have flaws as well. Indeed we also found that training in each country is an ever changing environment.

We would also like to thank a series of relevant Federal Government Ministers across political parties that have supported this work and the enormous contribution that a large number of staff of the Department of Education, Employment and Workplace Relations, including those based in some of the participating countries or territories, played in achieving the result we did.

I commend this report to you and am confident that when the future direction of skills development is placed firmly in the hands of industry in partnership with governments, regulators and training providers, we can achieve the goal of skilling our region to meet the challenges ahead.

Neville Palmer  
President NECA Australia



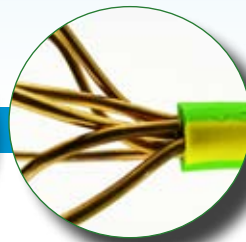
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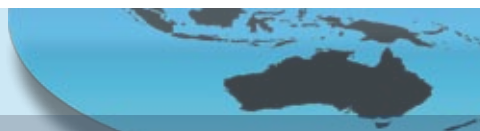
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# Section One

## Asia-Pacific Skills Mapping Project





## Background

The aim of the Overseas Skills Mapping Project is to work with the Federation of Asian Pacific Electrical Contractors Associations (FAPECA) members to identify existing skills development frameworks in the electrotechnology industry in a range of countries with potential to strengthen alignment between these frameworks and the Australian Qualifications Framework (AQF). The project will work with ten FAPECA countries or regions including Australia. These countries or regions include Hong Kong, Indonesia, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan and Thailand. The project will:

This report provides a detailed mapping of skills and competencies in the ten FAPECA countries or regions using the identified Australian qualifications. A comparative analysis has also been undertaken to determine the similarities and differences between the participating FAPECA countries or regions.

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- examine the skills and competencies of industry and government recognized electricians across a number of selected countries in the Asian region, including Australia;
- compare, and provide comment on other important elements of a national, regional or territory-wide training system from an employer's perspective, with a focus on electrotechnology;
- produce a matrix of skills and competencies utilized in each country and region and commonalities or gaps;
- provide a way forward to progress the matrix and broaden and enhance the formally recognised skills base of the industry across the Asian and Pacific region.

This report provides a detailed mapping of skills and competencies in the ten FAPECA countries or regions using the identified Australian qualifications. It also includes a comparison against the Australian training and regulatory environment, including industry and employer input and engagement, the relative role of regulators and training authorities, and quality assurance arrangements. The final outcome will be an industry and government validated framework for minimum regional standards for the electrotechnology and communications industry.

Detailed country reports providing information each FAPECA member's vocational education and training system have been developed for each of the ten participating countries or regions. These reports focus on the following elements of the vocational education and training system:

- qualifications framework;
- quality assurance processes;
- employer/industry input and engagement in the training system;
- development of training products and materials; and
- role of governments, including training authorities and regulators.

A comparative analysis has also been undertaken in order to determine the similarities and differences between the ten participating FAPECA countries or regions.

In order to map the skills and competencies using the identified Australian qualifications, it was necessary to examine the competency framework in each of the FAPECA countries or regions. The training and skills requirements for the occupation that is responsible for the installation of electrical wiring and equipment into facilities were investigated, and a competency comparison was undertaken in the following areas:

- work organisation and standards, regulations and Codes of Practice;
- role of regulators; and
- the role of an electrician, typical activities undertaken in each country or region and competencies required.



This report highlights the competencies that are common across all or most countries as well as the competencies that are seen as necessary to carry out the functions of this job role.

This information is included in Section Two of this report.

Finally, from the information compiled during the competency comparison, a competency and skills matrix has been developed which shows the key areas of the role of electrician in each of the ten participating FAPECA countries or regions. The competency and skills matrix is included in Section Three of this report.

This final project report provides a comparative analysis of both the vocational education and training system and the competency framework across all ten countries or regions. This analysis does not advocate a 'single best way' for all countries because there is no approach which is universally applicable, with each country having its own unique features and traditions.

## Project Methodology

Information about each participating FAPECA member's vocational education and training system and competency framework, including training and skill requirements, was obtained from the following sources:

- input and feedback from FAPECA members;
- consultations undertaken with key stakeholders in each country or region;
- desk-top and web-based research undertaken by BGA consultants; and
- contact with key stakeholders from relevant government organisations in each country or region.

The content of all project reports represents NECA's interpretation and analysis of information gathered from the various sources, but is not guaranteed as to accuracy or completeness. It is based on information collated over the last eighteen months and while deemed correct at the time, changes may have occurred affecting the accuracy of the content.

In addition, the views expressed in the reports do not necessarily represent the views of the Australian Government.

Draft versions of all country reports were provided to FAPECA members at the FAPECA meeting in Taiwan in November 2007. Each member was asked to provide feedback and circulate the report to the relevant government organisation(s) for comment.

Once feedback was received from the different countries, the appropriate changes were made and FAPECA members were presented with the final draft version of the country report at the FAPECA meeting in Singapore in May 2008. Each FAPECA member was provided with a final opportunity to provide feedback, make modifications and/or add information as required. This final project report provides a comparative analysis of the individual country reports, and includes the competency and skills matrix.

This overview is supported by detailed reports for each country or territory which are also available.

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## The Why - Rationale Behind the Project

The Overseas Skills Mapping Project, funded by the Department of Education, Employment and Workplace Relations (DEEWR), is part of the National Skills Shortages Strategy. The National Electrical and Communications Association (NECA) was contracted by DEEWR to work with the Federation of Asian Pacific Electrical Contractors Associations (FAPECA) on addressing skills development needs in the Asian Pacific region in the electrotechnology industry.

Some of the factors that led to the instigation of this project are outlined below.

The mobility of people and skills is increasing and does not only apply to the traditional labour supply countries. This is in the face of the issue of the significant differences between countries and their systems. The objective of the Overseas Skills Mapping Project is to identify these differences and develop a competency and skills matrix across the ten participating FAPECA countries and regions for the electrician occupational category.

This project aligns with the development of an industry led ASEAN Mutual Recognition Agreement for Electrical Engineering Works (E2WMRA) supporting the harmonisation of licensing, other regulations, and qualifications of the electrical industry across all ASEAN countries.

The successful work in harmonisation of regulatory and education and training work in Europe has also been a driving force behind this project, and has highlighted the necessity to undertake similar work in the Asia-Pacific region.

In order to face increasing competitiveness within the region and the rise of the new global giants (India and China), countries in the Asia-Pacific region need to work together in order to succeed. This project is an example of how this can be achieved.

Australian and other countries in Asia increasingly have off-shore operations with more businesses working across national borders, from multinationals to large and medium national companies in all countries. The issue of the skills of workers and additional training requirements must be addressed in such a context.

There has been an increase in the regulation in the industry, including a stronger focus on minimum skill and qualification requirements, and occupational health and safety.

## FAPECA Role

The Federation of Asian Pacific Electrical Contractors Associations (FAPECA) was established in 1986 and is a federation of electrical contractor organisations from 13 countries which meets at least annually. Members include Australia, Hawaii, Hong Kong, Indonesia, Korea, Malaysia, New Zealand, Philippines, Taiwan, Thailand and Singapore.

The US, Mexico and the European Electrical Contractors Associations also attend meetings.

A number of members (Indonesia, Singapore, Philippines, Malaysia and Thailand) are also directly connected to the ASEAN Economic Community through the ASEAN Federation of Electrical Engineering Contractors (AFEEC).

FAPECA is a forum which meets to promote and develop approaches to issues affecting the electrotechnology industry across the Asia-Pacific region of mutual co-operation and benefit to members.

In order to face increasing competitiveness within the region and the rise of the new global giants (India and China), countries in the Asia-Pacific region need to work together in order to succeed. This project is an example of how this can work.

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The fact that the major electrical contractor organisations in Australia, New Zealand and a significant number of Asian countries are members of FAPECA made it the most suitable partner for this project. In addition, skills recognition has emerged as a critical issue across the region and is currently one of the focal points of FAPECA.

## Vocational Education and Training Systems: Key Elements of Comparison

In order to fully understand the skills recognition and training requirements for electrical occupations in a particular country, it is necessary to examine the vocational education and training system in place. This provides the context surrounding the qualifications as well as background information leading to their development.

While there are considerable differences in the vocational education and training system between countries, there are some key elements which exist to varying degrees in most countries. These key elements were chosen for the purpose of this project and are considered to be important parts of any vocational education and training system.

Once the key elements were chosen, detailed country reports providing information about the vocational education and training system were developed for each of the participating FAPECA members. These key elements include:

- qualifications framework;
- quality assurance processes;
- employer/industry input and engagement in the training system;
- development of training products and materials; and
- role of regulators.

A comparative analysis was then undertaken in order to determine the similarities and differences between the participating FAPECA members.

The elements used for comparison are based on the Australian training system and therefore may not be relevant to all countries and regions. The absence of a particular feature in any one country does not reflect on the effectiveness of the training system in place. There may also be inaccuracies due to the absence of information or the interpretation of the information available. A final review phase provided all countries or regions with the opportunity to rectify any erroneous information.

## Skills Mapping Component

The competency and skills mapping component of the project was undertaken in parallel with the analysis of the vocational education and training system. This also resulted in a detailed country report being developed for each participating FAPECA member, followed by a comparative analysis and finally the development of the competency and skills matrix, included in Section Four of this report.

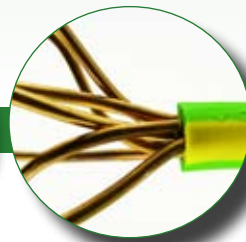
The elements used for comparison are based on the Australian training system and therefore may not be relevant to all countries and regions. The absence of a particular feature in any one country does not reflect on the effectiveness of the training system in place.

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# Section Two

## Asia-Pacific Skills Mapping Project





This section provides a comparative overview of the vocational education and training system and the electrical competency framework in each of the participating FAPECA countries and regions.

It should be noted that Korea was not included in the competency and skills mapping component due to their late inclusion in the project. It is anticipated that this will be completed in the future.

## Vocational Education and Training Systems: Comparative Information

A Qualifications Framework is an instrument for the development, classification and recognition of skills, knowledge and competencies along a continuum of agreed levels. It is a way of structuring existing and new qualifications which are defined by learning outcomes.

In the majority of countries, the competency and skills training required for the job role of electrician falls within the vocational education and training (VET) sector, sometimes known as technical and vocational education and training (TVET). In order to examine the qualification structure for this job role in a particular country or region, it is important to gain some understanding of the associated VET system.

After a comprehensive desktop research phase, a comparative analysis was undertaken and the findings are presented below for each of the key elements.

### Qualifications Framework

The development of national Qualifications Frameworks has been a major international trend in reforming national education and training systems since the late 1990s. The initiative first started and was diffused mostly among English-speaking developed countries. However, since the late 1990s such frameworks have also been adopted by many non-English-speaking and developing countries.

A Qualifications Framework is an instrument for the development, classification and recognition of skills, knowledge and competencies along a continuum of agreed levels. It is a way of structuring existing and new qualifications which are defined by learning outcomes i.e. clear statements of what the learner must know or be able to do whether learned in a classroom, on-the-job, or less formally.

The Qualifications Framework indicates the comparability of different qualifications and how one can progress from one level to another, within and across occupations or industrial sectors (and even across vocational and academic fields if the Qualifications Framework is designed to include both vocational and academic qualifications in a single framework).

All Qualifications Frameworks, however, provide a basis for improving the quality, accessibility, linkages and public or labour market recognition of qualifications within a country and internationally. The value of a Qualifications Framework lies in its potential to contribute to policy goals such as lifelong learning, recognition of skills, or improving the quality of education and training.<sup>1</sup>

The objective of this section is to provide information on the Qualifications Framework (or qualifications system) in place in each of the participating FAPECA countries or regions and to compare key elements.

The following FAPECA countries and regions have a formal Qualifications Framework that is linked to national training strategies:

<sup>1</sup> International Labour Office, 2007: An Introductory Guide to Qualifications Frameworks: Conceptual and Practical Issues for Policy Makers: A Report prepared for the International Labour Office (Ron Tuck)



- Australia
- Hong Kong SAR SAR
- Malaysia
- New Zealand
- Philippines
- Singapore

The following FAPECA countries have a qualifications system in place, or several systems, as opposed to what is formally recognised as a Qualifications Framework:

- Indonesia (has both a National Qualification Framework and a National Certification System)
- Thailand (has a Vocational Education Qualifications Framework and a Skill Standards Qualifications Framework, managed by two different ministries)
- Korea (National Technical/Non-Technical Qualification System and private qualifications)

Insufficient information for Taiwan made it impossible to ascertain if there is a Qualifications Framework or qualifications system in place.

### **Government Legislation**

Education and training is regulated by government legislation in each of the ten participating FAPECA countries or regions. This legislation is formally integrated into the country or regions legislative framework.

### **Employer and Industry Consultation**

Evidence suggests that employers and industry were consulted during the development of the Qualifications Framework or system in all of the participating FAPECA countries or regions.

### **National Standards**

In regards to national standards for training and assessment, including the registration of training organisations, there are variations between the different FAPECA members.

In the majority of cases, there are standards in place for training and assessment, often relating to the development of competency standards by industry. This appears to be the case in all countries and regions, except for Taiwan where a lack of information made an analysis at this time difficult.

Most FAPECA members also have national standards in place for the registration of training organisations.

### **Qualifications**

The Qualifications Framework or qualifications system in all participating FAPECA countries or regions have established levels for qualifications and corresponding level descriptors or guidelines.

In addition, most countries or regions have a national register for qualifications, with some variation in the format and location of these registers (Korea only had a register for one of its qualification systems, and insufficient information made it impossible to comment on Indonesia and Taiwan).

In regards to national standards for training and assessment, including the registration of training organisations, there are variations between the different FAPECA members. In most cases, there are standards in place for training and assessment, often relating to development of competency standards by industry.

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## Statements of Attainment

Statements of Attainment (or an equivalent) are issued for the partial completion of a qualification in Australia, New Zealand, the Philippines, Malaysia, Singapore and Indonesia, although the terminology varies between countries.

While training organisations in Hong Kong SAR do not issue a statement of attainment, they may issue a 'testimonial' for partial completion of a qualification (this is at the discretion of the training provider).

Individuals do not receive a statement of attainment for partial completion of a qualification in Thailand or Korea. No information was available for Taiwan.

## Linkage to the Apprenticeship System

Apprenticeships are linked to the training system, in particular to the Qualifications Framework or qualifications system in Australia, Hong Kong SAR, Indonesia (no apprenticeship for electricians), Malaysia, New Zealand, the Philippines and Singapore. However, there is some variation to the extent of this linkage depending on the particular country or region.

The apprenticeship model utilised in the various countries and regions also affects its linkage to the training system.

Korea does not have an apprenticeship system and apprenticeships are not linked to the qualifications system in Thailand. No information was available for Taiwan.

## Recognition of Prior Learning

Recognition of Prior Learning is available, or due to be implemented, in all FAPECA countries except Korea. No information was available for Taiwan.

## Recognition of Qualifications Awarded by Other Countries

There are considerable differences between FAPECA members in relation to the recognition of qualifications awarded by other countries. In most cases, apart from where there is mutual recognition agreements in place between particular countries, FAPECA members undertake assessment of the overseas qualifications, rather than directly recognising them. This is the situation in Australia and New Zealand who both have formal systems in place. Other countries and regions, including Korea, Malaysia, the Philippines, Singapore and Taiwan have more informal systems in place for the recognition of qualifications awarded by other countries.

In Hong Kong SAR, recognition of qualifications may occur on an informal basis (by employers or institutions), otherwise qualifications assessment is undertaken officially. There are mutual recognition arrangements in place between Hong Kong SAR and Mainland China.

Thailand recognises qualifications awarded by other countries on the condition that their education system is recognised by The Office of Civil Service Commission. Korea only recognises overseas qualifications when there are mutual recognition agreements in place.

Indonesia is currently developing a National Qualification Framework and it would appear that provisions will be made for the recognition of qualifications awarded by other countries.

There are considerable differences between FAPECA members in recognising qualifications awarded by other countries. In most cases, apart from where there is mutual recognition agreements in place between particular countries, FAPECA members undertake assessment of the overseas qualifications, rather than directly recognising them.



## Articulation Arrangements

The Qualifications Framework or qualifications system incorporates pathways or cross sectoral linkages in Australia, Hong Kong SAR, Malaysia, New Zealand, the Philippines and Singapore.

Hong Kong SAR has plans to implement a Credit Accumulation and Transfer (CAT) system.

Korea has a credit bank system in place as well as some other linkages between qualifications.

Further information is required to allow informed comment on Indonesia, Taiwan and Thailand.

## Accreditation of Qualifications

Qualifications are accredited in most FAPECA countries and regions, including Australia, Hong Kong SAR, Indonesia, Malaysia, the Philippines, Singapore and Thailand.

Qualifications are registered in New Zealand and it is the training organisations that undergo accreditation.

Korea does not have a formal accreditation process for qualifications, however they are commissioned by the government. No information was available for Taiwan.

The majority of FAPECA countries and regions have implemented a formal quality assurance system for vocational education and training which operates on a national or territory-wide level.

## Quality Assurance

Quality assurance systems are set up to ensure improvement and accountability of education and training. They aim at increasing the effectiveness and transparency of provision at all levels and thereby promoting mutual trust, recognition and mobility, within and across countries.<sup>2</sup>

Quality assurance is an essential element of vocational education and training systems and is necessary to ensure that stakeholders within the country and the international community have confidence in the system.

There are three important elements of quality assurance:

- validation of qualifications and/or standards;
- accreditation and audit of education and training institutions; and
- quality assurance of assessment leading to the award of qualifications.

The majority of FAPECA countries and regions have implemented a formal quality assurance system for vocational education and training which operates on a national or territory-wide level. These FAPECA members include:

- Australia
- Hong Kong SAR
- Indonesia
- Malaysia
- New Zealand
- Philippines
- Singapore
- Taiwan
- Thailand

<sup>2</sup> Commission of European Communities, 2005: Commission Staff Document: Towards a European Qualifications Framework for Lifelong Learning.



In addition, there is a national body that oversees all quality assurance activities for the vocational education and training sector in these countries. This system of central control ensures that there is compliance with national rules and regulations, that minimum standards are met and that learners and other stakeholders are appropriately protected.

In Malaysia, however, responsibility for quality assurance is delegated to several divisions, as opposed to one national body.

All of the countries and regions that have a formal quality assurance system in place for vocational education and training activities have also set quality standards or indicators.

Korea does not have a dedicated quality assurance system in place for vocational education and training, instead it implements principles from a general quality management system to training activities. Responsibility for this system lies with the Standards Information Centre.

### **Quality Assurance Processes for Qualifications, Training Organisations and Schools**

The majority of FAPECA countries have quality assurance processes in place for qualifications and training organisations, with the exception of Korea. This ensures confidence in both the standard of the qualification and the quality of training received.

#### **Audit Arrangements**

An important element of vocational education and training quality assurance systems is the audit of education and training institutions. All of the countries and regions that have dedicated vocational education and training quality assurance systems also have formal audit arrangements.

As Korea does not have a dedicated system in place, it has not implemented audit arrangements specifically for vocational education and training activities.

It is not possible to comment on Taiwan due to a lack of information.

#### **Accreditation/Registration of Training Organisations**

The accreditation and/or registration of training institutions is an integral part of any quality assurance system designed for education and training activities. All of the FAPECA countries and regions (except for Taiwan) have accreditation and/or registration arrangements in place for training organisations. Further information is required to be able to comment on Taiwan.

#### **Evidence Requirements**

Evidence requirements to assist training organisations with the accreditation/registration process have been established in Australia, Hong Kong SAR, Indonesia, Malaysia, New Zealand, Singapore, the Philippines, Taiwan and Thailand.

It appears that Korea has not established evidence requirements. It would appear that Indonesia also has evidence requirements in place.

#### **Best Practice and Benchmarking**

Best practice and benchmarking activities are encouraged in all FAPECA countries and regions participating in this project. All FAPECA countries and regions participate in skills competitions which may be organised locally or internationally.

All of the FAPECA countries and regions (except for Taiwan) have accreditation and/or registration arrangements in place for training organisations.



## Employer/Industry Input into the Training System

It is important to take into account the view of employers and industry during the development of national vocational education and training systems and to ensure that industry stakeholders have the opportunity to provide input on an ongoing basis. This helps to foster trust among the various stakeholders so they can have confidence in the integrity of the system.

Employers and industry were consulted during the development of the training system in all participating FAPECA countries or regions. These FAPECA members also have a mechanism in place for employers and industry to provide input into the training system on an ongoing basis.

There are formal communication channels between industry and key stakeholders in the training system in Australia, Hong Kong SAR, Indonesia, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

Korea does not currently have formal communication channels set up and it was difficult to determine the situation in Taiwan.

All of the participating FAPECA members compile industry specific information on a regular basis and this information is used to provide input into training strategies.

## Training Products and Materials

In most FAPECA countries and regions, qualifications and competency standards are developed nationally, with training programmes, courses, training materials and other resources being developed on a local level by training organisations and other relevant stakeholders. In some cases, these may also be developed nationally by government bodies.

### Development of Training Products and Materials

In Australia, Hong Kong SAR and New Zealand, training products such as competency standards and qualifications are generally developed nationally, while other training materials are developed locally by training organisations and other relevant stakeholders.

Indonesia, Korea, Malaysia, the Philippines and Singapore develop both training products and materials nationally, with some training materials being developed by training organisations.

In Taiwan and Thailand, training products and materials are developed by training organisations.

The process for developing training products and materials varies depending on what is being developed and who is responsible for this activity. Often there are formal processes in place for training products (eg for qualifications, courses, competency standards/units) and more informal processes in place for training and assessment materials.

### Review of Training Products and Materials

All participating FAPECA members (with the exception of Taiwan – more information is required to comment) have set review periods for qualifications, courses, competency standards/units and curriculum.

In most FAPECA countries and regions, qualifications and competency standards are developed nationally, with training programmes, courses, training materials and other resources being developed on a local level by training organisations and other relevant stakeholders.



For training materials, review is usually carried out on an as-needs basis and/or when significant changes occur which impact on the content.

### **National Standards**

All participating FAPECA members (with the exception of Taiwan – more information is required to comment) have developed national standards, qualifications, courses, competency standards/units and/or curriculum. Most participating FAPECA members have not established national standards for training materials, except when these become endorsed or quality assured.

Australia has a training structure based around the combination of an “on the job” and “off the job” supervised training programme conducted over a period of time, usually four years in duration.

### **Support Materials**

In Australia, Hong Kong SAR, Malaysia, New Zealand, Singapore & Thailand, support materials and resources are developed by training organisations and other interested parties.

In Korea and the Philippines, these are developed by government departments.

In Malaysia, support materials are developed by both government bodies and training organisations.

No information was available for Indonesia or Taiwan.

### **Availability of Training Products and Materials**

All participating FAPECA members (with the exception of Taiwan – more information is required to comment) have placed at least some training products and materials on a national database or register. In many of these countries or regions, some training products and materials are also available on-line.

## **Electrical Competency Overviews: Specific Country Information**

Information about the job role of electrician and associated competency and skill requirements was compiled for each of the participating FAPECA members. A detailed country report was written, an overview of which is provided below.

### **Australia**

Australia has a training structure based around the combination of an “on the job” and “off the job” supervised training programme conducted over a period of time, usually four years in duration.

The occupation of electrician is a licensed occupation in Australia and all workers need to hold a licence to practice in the industry. Successful completion of the qualification structure leads to the awarding of the licence to practice without any further examinations. Previous qualifications at this level required individuals to undertake further examination or assessment before a licence to practice in the industry was granted.

The structure of this qualification has a strong integration of “off and on job” components. Each competency standard unit/unit of competency identifies a discrete workplace requirement and includes the knowledge and skills that underpin competency as well as language, literacy and numeracy and occupational health and safety requirements.

The competency standard units must be adhered to in training and assessment to ensure consistency of outcomes.



There are set requirements for the core and stream core units of competence required for the electrician qualification within Australia. In addition, there is an extensive listing and strand grouping of electives that provide flexibility and customisation of the qualification to meet the specific needs of the industry sector throughout Australia. All of these units have been identified for this project.

### Qualification and Structure

- Certificate III in Electrotechnology Electrician (National Qualification Number - UEE3 08 06)

#### Scope

This qualification provides competencies to select, install, set up, test, fault find, repair and maintain electrical systems and equipment in building and premises. It includes the Electrical Regulators Advisory Committee (ERAC) requirements for an 'Electrician's licence'.

**The requirements for awarding this qualification are successful achievement of the following:**

- All of the Core competency standard units;
- The required number of Stream Core competency standard units;
- The required number of Elective Competency Standard Units as prescribed in the respective Schedule; and
- All the required prerequisite Competency Standard Units have been met.

More detailed information is contained in the country report.

## New Zealand

New Zealand has a training structure based around the combination of an "on the job" and off the job" supervised training programme conducted over a period of time, usually three to four years in duration.

The occupation of electrician is a licensed occupation in New Zealand and all workers need to hold a licence to practice in the industry. Successful completion of the qualification structure outlined below leads to the awarding of the licence to practice without the individual being required to undertake further examinations. Previous qualifications at this level required further examination or assessment before a licence to practice in the industry was granted.

### Qualification and Structure

- National Certificate in Electrical Engineering (Electrician for Registration) (Level 4, Credits 251)

#### Purpose

This qualification is for people wishing to pursue a career as an electrician. Electricians install, maintain, and repair electrical wiring and electrical and electronic equipment in residential, commercial, and industrial environments. The qualification has been designed to prepare trainees for a productive role in the industry, as well as covering the requirements for registration as an electrician under the Electricity Act 1992.

Typically, the qualification will be gained during the course of a three to four year training programme. Holders of this qualification have gained a range of knowledge and skills assessed both off-the-job (during courses conducted by accredited training providers)

New Zealand has a training structure based around the combination of an "on the job" and off the job" supervised training programme conducted over a period of time, usually three to four years in duration.

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and on-the-job (in the workplace). As this qualification shares credit with the National Certificate in Electrical Engineering (Level 2, Ref:0174) and the National Certificate in Electrical Engineering (Level 3, Ref: 0223 trainees may apply for one or both of those certificates along the way.

Holders of this qualification have demonstrated:

- knowledge of electrical theory, concepts, and trade practice, usually assessed during off-job training courses;
- skills and knowledge related to working safely in the electrical environment, including first aid, cardio-pulmonary resuscitation, safe-working practices, and safety testing;
- knowledge and application of relevant legislation, codes of practice, and standards;
- knowledge of the New Zealand electricity supply;
- competence in the practical skills of an electrician (usually assessed in the workplace) including: installation of cables, equipment, and fittings in various environments; maintenance and repair of electrical equipment; and testing of installations;
- generic skills and knowledge related to working effectively in the electrical industry, such as communication skills, report writing, and rights and responsibilities as an employee; and
- knowledge of the theory required for the registration of electricians.

The qualification also includes elective credits, reflecting the wide range of contexts in which electricians work. Trainees may choose standards that cover further skills and knowledge in the areas of electrical and electronic engineering, industrial processes, fire detection and alarm systems, and telecommunications.

The qualification also includes elective credits, reflecting the wide range of contexts in which electricians work. Trainees may choose standards that cover further skills and knowledge in the areas of electrical and electronic engineering, industrial processes, fire detection and alarm systems, and telecommunications.

Holders of this certificate may apply to the Electrical Workers Registration Board (EWRB) for electrical registration and a practising license under the provisions of the Electricity Act 1992. This is necessary if they wish to do prescribed electrical work as an electrician without the supervision of a Supervisor of Electrical Work.

This qualification can lead to the National Certificate in Electrical Engineering (Ref: 0951) at level 5 or the National Diploma in Engineering (Level 6) with strands in Computer Engineering, Electrical Engineering, Electronics, Industrial Measurement and Control, and Telecommunications (Ref: 0846).

This qualification replaced the National Certificate in Electrical Engineering (Electrician) (Level 4, Ref: 0313).

### **Completion requirements**

The requirements for awarding this qualification are that the following are successfully achieved:

- All of the compulsory standards;
- The required number of elective standards (a minimum of 25 credits at level 2 or above from certain subfields and domains); and
- That the required number of credits have been achieved.

### **Award of NQF Qualifications**

Credit gained for a standard may be used only once to meet the requirements of this qualification.



Unit standards and achievement standards that are equivalent in outcome are mutually exclusive for the purpose of award. The table of mutually exclusive standards is provided in the Qualifications Authority Rules and Procedures publications available at [www.nzqa.govt.nz/ncea/](http://www.nzqa.govt.nz/ncea/).

Reviewed standards that continue to recognise the same overall outcome are registered as new versions and retain their identification number (Id). Any version of a standard with the same Id may be used to meet qualification requirements that list the Id and/or that specify the past or current classification of the standard.

### **Transition Arrangements**

This qualification replaced the National Certificate in Electrical Engineering (Electrician) (Level 4, Ref: 0313) in September 2005. This followed a major review of competency based training, carried out by the electrical industry during 2003 and 2004, which resulted in many standards being revised. The inclusion of standard 21766 is reflected in the qualification title, which was changed to simplify identification between holders of this and the previous qualification where the EWRB Theory Examination was external.

Results of this review included changes to both the structure and content of some competency standards. In addition, some standards were removed, others were replaced by new standards, some new standards were added, the titles of some standards were modified, and the elective section was expanded. The credit total also decreased from 257 to 251.

More detailed information can be found on the NZ Qualifications Authority website (Review Summaries section).

Credit gained in Engineering and Technology/Electronic Technology can be used to meet the requirements of the Elective.

The last deadline to meet the requirements of the National Certificate in Electrical Engineering (Electrician) (Level 4, Ref: 0313) version 2 and 3 was 31 December 2007.

Trainees were required to either complete the requirements of that qualification before 31 December 2007 or transfer to this qualification.

All new trainees have been enrolled in programmes leading to the new qualification.

Industry will continue to recognise the former qualification, and there should be no need to 'upgrade' by those who have already achieved it.

### **Standard Setting Body**

The ElectroTechnology Industry Training Organisation is the standard setting body for the electrotechnology industry in New Zealand.

The review of this qualification is planned to take place in 2010.

More detailed information is contained in the country report.

## **Philippines**

The qualification of electrician is a licensed occupation in the Philippines and all workers



need to hold a licence to practice in the industry.

### **Qualification and Structure**

- Building Wiring Installation NC II Qualification

#### **Scope**

The Building Wiring Installation NC II Qualification consists of competencies that a person must achieve to enable him/her to perform installation, maintenance and commissioning of electrical wiring and related equipment where the voltage does not exceed 600 volts in residential houses/buildings.

A person who has achieved this Qualification is competent to be a:

- Building Wiring Electrician
- Maintenance Electrician

#### **Completion requirements**

The requirements for awarding this qualification are that the following are successfully achieved:

- Compulsory four units of competency from basic competencies;
- Compulsory five units of competency from common competencies; and
- Compulsory seven units of competency from core competencies.

#### **Training Delivery**

The delivery of training should adhere to the design of the curriculum. Delivery is guided by the following ten basic principles of competency-based TVET:

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is learner-centred and should accommodate individualised and selfpaced learning strategies;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based on the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the-job components;
- Training program allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Training programs are registered with the UTPRAS.

The competency-based TVET system recognises various types of delivery modes, both on and off-the-job, as long as the learning is driven by the competency standards

The Building Wiring Installation NC II Qualification consists of competencies that a person must achieve to enable him/her to perform installation, maintenance and commissioning of electrical wiring and related equipment where the voltage does not exceed 600 volts in residential houses/buildings.

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specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualised mode of training delivery is preferred and recommended. Thus programs should contain both in-school and industry based training or fieldwork components. Details can be found in the Dual Training System (DTS) Implementing Rules and Regulations.
- Modular/self-paced is a competency-based training modality wherein the trainee is allowed to progress at his/her own pace. The trainer only facilitates the training delivery.
- Peer teaching/mentoring is a training modality, wherein fast learners are given the opportunity to assist the slower learners.
- Supervised Industry Training or On-the-Job Training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations.
- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may comprise correspondence study, audio, video and computer technologies.
- Project-based instruction is an authentic instructional model or strategy in which students plan, implement and evaluate projects that have real world applications.

The qualification of Building Wiring Installation NC II may be attained through demonstration of competence through a single comprehensive project-type assessment covering all required units of competency of the qualification.

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### **National Assessment and Certification Arrangements**

To attain the National Qualification of Building Wiring Installation NC II, the candidate must demonstrate competence in all the specified units of competency. Successful candidates are awarded a National Certificate signed by the TESDA Director General.

The qualification of Building Wiring Installation NC II may be attained through demonstration of competence through a single comprehensive project-type assessment covering all required units of competency of the qualification.

Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

The following individuals are able to apply for assessment and certification:

- Graduates of formal, non-formal and informal including enterprise-based training programs; and
- Experienced Workers (employees or self-employed).

## Taiwan



Article 75-2 of the Taiwan Electricity Act stipulates that an electrician working for an electrical contractor shall be licensed by the pertinent local agency. All citizens 15 years or older with normal ability to distinguish colour may take the electrical examination.

There are three categories of electrician qualifications within the Taiwan training system. These include:

- A) Electrical Technician
- B) Electrician
- C) Professional Electrical Engineer

The competencies that cover these qualifications are listed below:

### **A. Electrical Technician**

There are three classes within the category of Electrical Technician, as shown below:

- *Class C*

A participant aged 15 and who has graduated from junior high school, with the certificate document, is permitted to attend Skill Test Class C. Where the participant is subject to risky work, they should be over the age of 18.

- *Class B*

A citizen qualified by any one of the following statements, and with the certificate document, is entitled to attend Class B Skill Test.

- A participant who has received over 1,600 hours training for the relevant vocations after obtaining the Class C Skill Certificate, or has two years experience in related work.
- After obtaining the Class C Skill Certificate, the participant graduates from senior high school or is at the highest grade in high school.
- After obtaining a Class C Technician Certificate, a student in the third grade or higher of a 5-year junior college; a 2nd year or 3rd year junior college student; a student of a technology college or university, is permitted to undertake the test.
- A participant with four years experience in related work after being trained for 800 hours in related vocations.
- A participant with two years experience in related work after being trained for 1,600 hours in related vocations.
- A participant who has received 3,200 hours training in related vocations.
- A participant who has received 1,600 hours training and has graduated from senior high school.
- A participant with one year of experience in related work after completing 800 hours of training in related vocations, and who has completed senior high school education.
- A participant with two years of experience in relevant work after two years of training in related technology.
- A participant in employment in related work for 3 years after finishing senior high school.
- A participant graduating from a training school, Technology College or University, or who has achieved the highest grades at school.
- A participant with six years experience in related work.

There are three categories of electrician qualifications within the Taiwan training system. These include:  
A - Electrical Technician;  
B - Electrician; and  
C - Professional Electrical Engineer.



- *Class A*

A participant, qualified by any of the following, with certificate documents, is entitled to attend the Class A Skill Test.

- A participant who has received over 800 hours training in relevant vocations after obtaining Class B Skill Certificate, or has four years experience in related work.
- After obtaining Class B Skill certificate, a participant with a senior high school diploma and who has two years of experience in related work.
- A participant with a training school diploma and who receives over 400 hours of training in related work after obtaining the Class B Technician Certificate.
- A participant with a junior college diploma and who has one year of experience in related work after obtaining the Class C Technician Certificate.
- A participant who has obtained the Class B Skill Certificate and who has graduated from Technology College or university.
- A participant with a training school diploma who has been trained for over 1,600 hours and who has subsequently gained at least one year of experience in related work.
- A participant with five years of experience in related work after completing junior college education.
- A participant who has at least three years experience in related work after completing Technology College or university studies.

To obtain the qualification of electrician the applicant must pass the qualification examinations which differentiate from A and B levels. However this regulation has been revised and there have not been any examinations since July 2007.

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The Electrical Technician involves six specific areas:

1. Commercial Wiring
2. Electric Distribution
3. Under Ground Cabling
4. Electrical Equipment Inspection
5. Substation Facility Installation and Maintenance
6. Industrial Wiring

### **B. Electrician**

To obtain the qualification of electrician the applicant must pass the qualification examinations which differentiate from A and B levels. However, this regulation has been revised and there have not been any examinations since July 2007. In practice, the level B of the electrician qualification is equal to the aforesaid class C (of the Technician qualification), and the level A of the electrician is also equal to the aforesaid class B.

### **C. Professional Electrical Engineer**

The qualification of Professional Electrical Engineer must have:

- graduated from college or university of electrical related department; and
- passed the particular examination held by The Examination Yuan.

The qualified Professional Electrical Engineer is allowed to deal with further complicated design and supervision in the field of engineering.

More detailed information is contained in the country report.



## Singapore

To carry out work as an electrician in Singapore, the regulator requires that the person must be licensed and to award that licence the person must;

- hold a National Technical Certificate including curriculum that is relevant to the electrical work which an electrician is authorised to perform or such other qualifications as may be acceptable to the Authority; and
- have not less than 2 years' practical experience relevant to the electrical work which an electrician is authorised to perform.

### Qualification and Structure

Currently the National Technical Certificate which covers this requirement is the National ITE Certificate (Nitec) in Electrical Technology.

In addition, the Singapore Workforce Skills Qualifications (WSQ) system has developed a robust system benchmarked against world standards. The Workforce Development Authority (WDA) developed the WSQ in close consultation with various sectors' Industry Skills and Training Councils. This has resulted in a set of competency standards and On the Job Training (OJT) Blueprint standards for work performance. The electrical industry is not recorded as an approved industry (as at 1 May 2008) but has developed the standards to be implemented.

Both qualifications and competency skill standards have been mapped for this project.

- Nitec in Electrical Technology

This course provides students with the technical skills and knowledge to maintain electrical installations, equipment and systems as well as telecommunication and data cabling systems in domestic premises, commercial buildings and industrial plants according to engineering specifications and relevant codes of practice.

### Skill Standards

The roles carried out within the skills standards framework include Wireman, Electrician and Technician. The roles are sequential in that a higher skill set is required to carry out the roles, with the wireman as the base set and technician with the highest level of skills.

### NSRS On the Job Training (OJT) Blueprints

The OJT Blueprints and units of competence specify workplace training and work performance criteria required to successfully achieve competence. These are for the occupations of wireman, electrician and technician.

More detailed information is contained in the country report.

## Hong Kong SAR Special Administrative Region of China

The training system for electrical workers in the Hong Kong SAR Special Administrative Region of China is currently undergoing a review phase. Information concerning the structure and competency requirements is being reviewed and has been submitted to industry for comment at this point in time. Therefore, comprehensive information regarding the training structure and requirements is not available to be mapped and commented in the scope of this project.

However, despite the fact that the Vocational Training Council and the Education Bureau are not ready to provide a government submission on the skill and training requirements for the job role of electrician, some insight was provided by local industry on the work

The Singapore Workforce Skills Qualifications (WSQ) system has developed a robust system benchmarked against world standards. The Workforce Development Authority (WDA) developed the WSQ in close consultation with various sectors' Industry Skills and Training Councils.



and competency expectations for electricians. This information has been provided by the Hong Kong SAR Electrical Contractors Association (HKECA) and is not the official stance of the Government of the Hong Kong SAR SAR. The final version is currently under consideration.

Previous to this review period, the training undertaken for the awarding of an electrical qualification was carried out under the apprenticeship system. Older and out of date documentation indicated that this was the case.

An extract from the Regulators' site is included below and indicates this aspect of training required to award a licence to practice at the completion of training.

- **Electricity (Registration) Regulations – Regulation 4  
Grade A electrical work (Part III)**

#### **Grades of electrical work and qualifications of workers**

1. Grade A electrical work is electrical work on that part of a low voltage fixed electrical installation that has a maximum demand not exceeding 400 A, single or three phase.
2. An individual is qualified to be registered for Grade A electrical work if he/she satisfies the Director:
  - (a) that he/she:
    - (i) has completed a registered contract of apprenticeship under the Apprenticeship Ordinance (Cap 47) in the trade of electrical fitter or electrician;
    - (ii) holds a craft certificate in electrical engineering issued by a technical institute; and
    - (iii) has at least 1 year of practical experience in electrical work.
  - (b) that he/she has been employed as an electrical worker for at least five years, at least one year of which included practical experience in electrical work and he/she:
    - (i) holds a Certificate of the Electrician or Electrical Fitter Upgrading Course issued by the Electrical Industry Training Centre of the Vocational Training Council or has an equivalent qualification; or
    - (ii) has passed an examination or trade test approved or set by the Director;
  - (c) that he/she has been employed as an electrical worker for at least six years, at least one year of which included practical experience in electrical work; or
  - (d) that his/her qualifications and experience are equivalent to those required under paragraph (a), (b) or (c).
3. In order for an applicant to qualify for registration under subregulation (2)(c), or to qualify for registration under subregulation (2)(d) on the basis of equivalence to subregulation (2)(c), his/her application for registration must be received by the Director on or before a date to be fixed by the Director and published in the Gazette. (Enacted 1990)

The training system for electrical workers in the Hong Kong Special Administrative Region of China is currently undergoing a review phase.

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More detailed information is contained in the territory report.



## Thailand

A law concerning the licensing of electricians in Thailand is going to be promulgated in the near future. Once this has occurred, the occupation of electrician will be controlled. At present, licensing and registration for electricians is not compulsory or enforced by law.

### Qualifications and Structure

The two qualifications that permit a person to work within the electrical area in Thailand are the:

1. Certificate of Vocational Education – Electrical and Electronics trades; and
2. Diploma of Vocational Education – Electrical Power Technology.

The diploma level qualification is the higher level qualification and is most likely the equivalent of the other electrical installation qualifications throughout the region.

Each qualification is structured around a core and a specialisation to allow for the diversity within the work sector. The completion of the core and a specialisation constitutes the awarding of the qualification.

More detailed information is contained in the country report.

## Indonesia

The Indonesian electrical training required to undertake duties within the electrical field are outlined below. There are three levels of qualifications and all require work experience and knowledge based study prior to submitting for a proficiency examination for the completion of each level.

### Qualifications and Structure

Professional Qualifications consist of:

- Junior – EXPERT;
- Intermediate – EXPERT; and
- Senior – EXPERT.

Professional classifications consist of four professional sub classifications in Electrical Engineering, Low Voltage, Medium Voltage, High Voltage and Power Generation and/or sub-divisions of User Installation, Distribution Installation, Transmission Installation and Power Generation Installation.

The scope, educational qualifications and underpinning knowledge required by each of these categories is outlined below.

#### *Junior – EXPERT*

### Scope

A competent person to plan, lead and/or oversee the installation of all Low Voltage Electrical Installations (indoor or outdoor) for Users, Low Voltage Distribution Network Household Lines and Low Voltage Power Generation Installation.

In Indonesia there are three levels of electrical qualification and all require work experience and knowledge-based study prior to submitting for a proficiency examination for the completion of each level.



### **Educational Qualifications**

- Three year Diploma in Electrical Engineering or equivalent plus two years work experience, or
- Undergraduate Degree Electrical Engineering plus one year of work experience.

### **Underpinning Knowledge**

- Work Safety & Health
- General requirements of Electrical Installations
- Electricity Basic Theories
- Electrical Power Engineering
- Electrical Machines (AC & DC)
- Measuring Gauges & Electrical Measurement
- Regulations on Power Generation
- Distribution Installations

### *Intermediate – EXPERT*

#### **Scope:**

A competent person to plan, lead and or oversee the installation of Low Voltage or High Voltage Electrical Installations for Users, Distribution and Power Generation, Control System in Industries and Micro scale Power Generation.

#### **Educational Qualification:**

- Junior Expert Certificate plus two years work experience; or
- Three year Diploma in Electrical Engineering or equivalent plus seven years of work experience; or
- Undergraduate Degree Electrical Engineering plus five of years work experience.

#### **Underpinning Knowledge**

- Work Safety & Health
- General requirements of Electrical Installations
- Electricity Basic Theories
- Electrical Power Engineering
- Electrical Machines (AC & DC)
- Lighting Installations
- Industrial Installations
- Measuring Gauges & Electrical Measurement
- Regulations on Power Generation
- Distribution Installations
- Transmission Installations
- Micro Power Generation (<5Mw)



### Senior – EXPERT

#### Scope:

A competent person to plan, lead and or oversee the installation of Low Voltage, Medium Voltage and High Voltage Electrical Installations for Users, Distribution, Transmission and Power Generation.

#### Educational Qualifications:

- Intermediate Expert Certificate plus five years work experience after obtaining intermediate certificate; or
- Three year Diploma in Electrical Engineering or equivalent plus twelve years work experience; or
- Undergraduate Degree Electrical Engineering plus ten years work experience.

#### Underpinning Knowledge

- Work Safety & Health
- General requirements of Electrical Installations
- Electricity Basic Theories
- Electrical Power Engineering
- Electrical Machines (AC & DC)
- Lighting Installations
- Industrial Installations
- Measuring Gauges & Electrical Measurement
- Regulations on Power Generation
- Distribution Installations
- Transmission Installations
- Micro Power Generation (<5Mw)
- Macro Power Generation

More detailed information is contained in the country report.

## Malaysia

Electrical installation work is carried out by three distinct occupations under the Malaysian National Occupation Skill Standard (NOSS). All occupations have multiple skill levels incorporated within their structure. The occupations Wireman (C020-1/2), Chargeman (C030-1/2/3) and Electrical Technician (C-051–1/2/3) are based against workplace competency standards and encompass both an underpinning knowledge and workplace skill component.

#### Wireman/Chargeman

The Wireman occupation has Level 1 (C020-1) and Level 2 (C020-2) stages within its structure. Progression through the structure is sequential and based on progressive acquirement of relevant skills and knowledge.

The Chargeman occupation has Level 1 (C030-1), Level 2 (C030-2) and Level 3 (C030-3) stages within its structure. Progression through the structure is sequential and based on progressive acquirement of relevant skills and knowledge.

These two occupations are grouped around a common set of competencies although the Chargeman has an extended knowledge and skill requirement in installation and inspection of electrical installations.

In Malaysia, electrical installation work is carried out by three distinct occupations under the Malaysian National Occupation Skill Standard. All occupations have multiple skill levels incorporated within their structure.



### **Occupational definition: Wireman**

A wireman interprets, estimates materials, installs, commissions and maintains an electrical installation. In particular he/she:

- Reads blueprints.
- Prepares schematic diagrams.
- Makes estimates.
- Verifies all equipment and materials to be used in the installation.
- Installs equipment and conductors to specification.
- Performs commissioning test on the installation.
- Performs diagnostic tests for the remedial of defective accessories and circuits.
- Maintains the installation for serviceability.
- Recommends measures to improve the efficiency of the equipment.
- Maintains accurate records of the installation.
- Supervises the workers.
- Fulfils the administrative reporting requirements.

### **Occupational definition: Electrical Chargeman**

An electrical chargeman performs technical tasks connected with electrical engineering services, as well as planning new installations, acquiring equipment, operation, maintenance and repair of electrical equipment, facilities and the distribution system. In particular he/she:

- Provides technical assistance connected with installation and development of electrical equipment, facilities and the distribution system.
- Designs and prepares blueprints/circuit diagrams of electrical installations and circuitry according to the specification provided.
- Prepares detailed estimates of quantity and costs of materials and labour required for manufacture and installation according to the specification provided.
- Provides technical supervision of the manufacture, installation, utilisation, maintenance and repair of electrical system and equipment to ensure satisfactory performance and compliance with specification and regulation.
- Applies technical knowledge of electrical engineering principles and practice in order to identify and solve problems arising in the course of their work.
- Performs related tasks.
- Supervises other workers.

### **Electrical Technician**

The Electrical Technician occupation has Level 1 (C051-1), Level 2 (C051-2) and Level 3 (C051-3) stages within its structure. Progression through the structure is sequential and based on progressive acquirement of relevant skills and knowledge. This occupation has provision to progress to level 4 and 5 within the NOSS structure, but these levels are not covered within the scope of this project.

#### *Level 1 - Occupational Definition: Junior Electrical Technician:*

A Junior Electrical Technician is designated to:

- Perform single phase surface wiring, concealed wiring, conduit wiring, trunking work, fitting and accessories.
- Perform fault findings, repairs, testing and assist Electrical Technician in all electrical installation and maintenance works.



In particular he/she;

- Performs domestic wiring.
- Performs electrical testing.
- Performs troubleshooting works.
- Performs Single Phase drawing.

*Level 2 - Occupational Definition: Electrical Technician*

An Electrical Technician is designated to:

- Perform phase surface wiring, concealed wiring, conduit wiring, trunking works, fitting and accessories.
- Perform fault finding, repairs, testing, cabling works, motor services & installation and earthing system installation works. He/she also assists Senior Electrical Technician in all electrical installation and maintenance works.

In particular he/she:

- Performs Industrial wiring.
- Performs troubleshooting works.
- Performs Three Phase drawings.
- Performs Three Phase electrical testing.
- Performs electrical maintenance works.

*Level 3 - Occupational Definition: Senior Electrical Technician*

A Senior Electrical Technician is designated to perform:

- LV electrical power distribution, machinery installation and maintenance of motor, generator, transformer and similar.
- Also installs and maintains street lighting, supervises subordinates and assists Assistant Engineer in installation and maintenance of electrical works.

In particular he/she:

- Performs electrical installation.
- Performs electrical maintenance.
- Performs troubleshooting works.
- Performs supervisory function.

More detailed information is contained in the country report.



## Electrical Competencies: Comparative Information

The following section provides information on the role of regulators and compares the job role of electrician in the ten FAPECA countries and regions participating in this project.

The competencies that are common across all or most countries and the competencies that are seen as necessary to carry out the functions of this job role are identified.

### Role of Regulators

Regulators play an important role in the development and review of qualifications, and this can have an impact on the training systems of each country.

Regulators are often responsible for the issuing of professional licences.

### Government Legislation

The following participating FAPECA members have government legislation to regulate who can undertake electrical work:

- Australia
- Hong Kong SAR
- Korea
- Malaysia
- New Zealand
- Philippines
- Singapore
- Taiwan

In Thailand, licences are not compulsory and therefore not covered by government legislation. This will change in the near future as a law regulating who can undertake electrical work is due to be promulgated.

Indonesia has government legislation that provides for national competency standards related to electricity, the involvement of regulators and all other relevant associations, and skills identification. However, it is unclear as to whether this legislation regulates who can undertake electrical installation work.

### Regulatory Authority

There is a regulatory authority responsible for the licensing of electricians in Australia, Hong Kong SAR, Malaysia, New Zealand, the Philippines and Singapore.

In Korea, the mayor or provincial governor of the location of the desired electrical construction regulates all the related licensing, including the issuing of licences.

In Thailand, the Department of Skill Development is currently responsible for issuing licences. With the introduction of a new law regulating electrical work, a new regulatory authority may become responsible for issuing electrical licences.

It was difficult to determine if the regulatory authorities in Indonesia and Taiwan are responsible for the licensing of electricians.

There is a regulatory authority responsible for the licensing of electricians in Australia, Hong Kong, Malaysia, New Zealand, the Philippines and Singapore.

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## National/Territory-Wide Licensing Requirements

Licensing requirements are the same on a national or territory-wide level in Australia, Hong Kong SAR, Korea, Malaysia, New Zealand, the Philippines and Singapore.

Licensing requirements are not the same on a national level in Thailand. It was not possible to determine the situation in Indonesia or Taiwan due to a lack of available information.

Licensing is integrated into the VET system in Australia (embedded in competency standards), Hong Kong SAR, Korea, Malaysia, New Zealand and Singapore, although the degree of integration varies somewhat between these participating FAPECA members.

Licensing is not integrated into the VET system in the Philippines or Thailand.

More information is required in order to be able to comment on Indonesia and Taiwan.

## Final 'Capstone' Assessment

There is a final 'capstone' assessment in Australia, Hong Kong SAR (examination), New Zealand and Singapore (examination and interview).

From the information available, it appears that none of the other participating FAPECA members utilise a final 'capstone' assessment in electrical training and licensing.

## Mutual recognition of occupational licences

As a general rule, most participating FAPECA members do not recognise occupational licences issued by other countries or regions. However, the qualifications leading to these licences may be assessed in order to determine whether they are equivalent to local qualifications. Once a qualification has been assessed, it may be possible for individuals to obtain an occupational licence, on the condition that local requirements are met. This is the case in Australia, Hong Kong SAR, New Zealand, and Singapore.

Some countries have mutual recognition arrangements in place, usually in the form of formal agreements or memorandums of understanding between particular countries or regions.

Mutual recognition of occupational licences/qualifications in the other participating FAPECA countries or regions is limited or non-existent.

## Job Role - Electrician

There are differences in the way each of the participating FAPECA countries or territories define the basic job role of an electrician. All countries include install, test and certify electrical wiring and equipment installations within the job role. Although all participating FAPECA members carry out the role of installation of wiring and equipment, some require further technical and higher roles to carry out tasks within the same occupation.

The tasks and activities associated with installing, wiring and equipment, testing and certifying electrical installations and supervision of other workers is the basic electrical job role within the region and most participating FAPECA countries assign the term of 'Electrician' to this role. This basic job description is the benchmark for the information in this report.

As a general rule, most participating FAPECA members do not recognise occupational licences issued by other countries or regions. However, the qualifications leading to these licences may be assessed in order to determine whether they are equivalent to local qualifications.



## Work Organisation

In the countries or regions where wiring installation is the main (and in some cases the only) function of the work undertaken, a greater emphasis is placed on the wiring installation and design area of the job role. In Malaysia, Singapore, Philippines and Thailand the wiring installation role is carried out by entry level and semi skilled workers until they gain experience and undertake further study to complement this work experience.

The countries that train under the traditional apprenticeship system require the development of a greater and broader skills base. In addition to the wiring installation being regarded as the major focus of the job role there are a wider variety of work activities that are incorporated into training and are required to carry out the role of an electrician.

## Standards, Regulations and Codes of Practice

All jurisdictions operate within Safety Codes of Practice and have regulations which require minimum standards for work practices. However, for those countries that operate in a formal standards environment and have more formal work practices and training requirements in place, more in depth training and work performance standards are evident. These requirements are reflected in the mapping charts and competency matrix included in Section Three.

## Areas of Activity - Electrician

For the purpose of this report, the role of an electrician has been divided into nine broad areas of activity and these activities have been mapped for each of the participating FAPECA countries.

The nine broad areas are:

- Alternating Current Principles
- Basic Electrical Installation Principles
- Basic Electrical Principles
- Occupational Health & Safety
- Wiring Installation & Design
- Electrical Equipment Installation
- Testing & Compliance
- Workplace Communication
- Specialisation/Electives

Information relevant to the participating countries for each of these areas of activity follows.

- **Alternating Current Principles**

Three countries, Australia, Indonesia and New Zealand have a requirement for electricians to display a knowledge of Alternating Current Principles. This is indicative of the job role carried out within these countries in that there is a diagnostic role associated with the job role and electricians do not just perform basic wiring activities. There is a need to understand alternating current principles in diagnostic and fault finding activities in both equipment and transmission systems.

Electricians in Australia, Indonesia and New Zealand require knowledge of Alternating Current Principles. This is indicative of the job role carried out within these countries in that there is a diagnostic role associated with the job role and electricians do not just perform basic wiring activities.



- **Basic Electrical Installation Principles**

This area covers basic hand skills, hand and power tool maintenance and operation, small fabrication skill development, circuit reading, drawing interpretation in order to carry out wiring installations from supplied plans, the use of manuals, and the ability to follow written instructions.

All of the FAPECA countries and regions have some element of this area of activity in their training programs.

- **Basic Electrical Principles**

This area covers basic circuitry and basic electrical principles. All countries have this area of activity in training programs and mostly in a common format.

- **Occupational Health & Safety**

Occupational Health & Safety is covered in all countries. All countries incorporate this area of activity with relevant work practices but those countries with workplace competency standards have a clearly defined section in their training and work regimes (this is the case in Australia, New Zealand and the Philippines).

- **Wiring Installation & Design**

This area of activity is the largest area of work undertaken within the job role. All countries have multiple areas of work activity in wiring installation in both single and multiple phase applications. Those countries that have a broader expectation of the job role also have elements of design capabilities in the installation section (this is the case in Australia, New Zealand and the Philippines).

- **Electrical Equipment Installation**

As with wiring installation, electrical equipment installation is a core activity for electricians in all countries. All aspects of equipment and accessories are highlighted in both training and work performance activities in all participating countries.

- **Testing & Compliance**

The testing and compliance area of activity is part of the job role in Australia and New Zealand only. In Malaysia this area of activity is restricted to 'experienced' electricians. In other participating countries this area of activity is carried out by another job role. The regulator in each country is the major driver of this activity and ensures regulation and conformance to wiring rules, codes of practice and work performance standards.

- **Workplace Communication**

All countries have a specific work performance and reporting component of the electrician job role. Depending on the country, specific work communication practices and requirements are required. These are usually centred around work organisation and reporting activities.

- **Specialisation/Electives**

The specialisation/electives utilised in each of the participating FAPECA countries are broad in scope and substantial in number. These areas of specialisation and electives allow for each country to cater for local conditions, industry and individual requirements. Participating countries tailor the training and job role to suit the required applications and local conditions. The areas of specialisation and electives do not impact on the basic electrician job role as previously described by the nine broad areas of activity and as such they are not listed within this report.

As with wiring installation, electrical equipment installation is a core activity for electricians in all countries. All aspects of equipment and accessories are highlighted in both training and work performance activities in all participating countries.

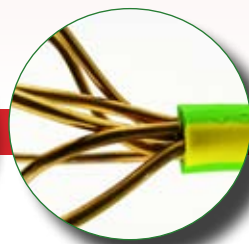
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# Section Three

## Asia-Pacific Skills Mapping Project







## Competency Skills Matrix

As part of the Overseas Skills Mapping Project, a competency skill matrix has been developed to display the competencies that are required by each country to award a qualification for a person working as an electrician.

The objective of the competency component of the project was to map industry qualifications from each country, identify the competencies or standards that are common in each of the key areas of activity, and identify gaps and highlight additional competencies or skills development required.

The competency skills matrix is mapped against the role of an electrician and the nine areas of activity addressed in the previous section.

These areas include:

- Alternating Current Principles
- Basic Electrical Installation Principles
- Basic Electrical Principles
- Occupational Health & Safety
- Wiring Installation & Design
- Electrical Equipment Installation
- Testing & Compliance
- Workplace Communication
- Specialisation/Electives

Evidence of these areas of activity that cover the job role of electrician was found in all of the FAPECA countries and regions that are included in this project. The matrix shows core activities that are undertaken by all areas, including installation of electrical wiring and equipment and workplace communication, and also highlights other requirements of the countries mapped.

The countries with broader and more extensive training requirements also require knowledge of the areas of Alternating Current Principles and Testing and Compliance from the electrical worker. Specific Occupational Health and Safety units may not be delivered in all countries but this area is undertaken and incorporated in all electrical training due to the dangerous nature of work within the electrical industry.

The specialisation area has not been shown in detail as it is an area that varies greatly from country to country. Details are provided in the individual FAPECA country reports.

Discussion was held at the FAPECA meeting in May 2008 to validate the matrix with the objective of gaining agreement on minimum regional training standards for the industry.

This will be an important component of further work.

The Competency Skills Matrix is included on the following pages.

The competency skills matrix is mapped against the role of an electrician and the nine areas of activity addressed in the previous section.

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# Alternating Current Principles

<b>Australia</b> UEENEEG00 2B - Solve problems in single and three phase low voltage circuits	<b>Hong Kong SAR</b> Be able to demonstrate knowledge and understanding of AC quantities (eg - current, voltage, power and power factor) Be able to demonstrate basic knowledge and understanding of three-phase power supply quantities (eg - line and phase values)	<b>Indonesia</b> Electrical Power Engineering	<b>Malaysia</b> No information available for this level qualification	<b>New Zealand</b> 1206 - Demonstrate knowledge of AC power and power factor 2031 - Demonstrate knowledge of three-phase theory 15850 - Demonstrate knowledge of single-phase transformers 15853 - Demonstrate knowledge of alternating current (AC) theory 15857 - Demonstrate knowledge of three-phase transformers	<b>Philippines</b> No information available for this level qualification	<b>Singapore</b> EE2001PA - M1 Electrical Principles	<b>Taiwan</b> No information available for this level qualification	<b>Thailand</b> No information available for this level qualification
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# Basic Electrical Installation Principles

Australia	Hong Kong SAR	Indonesia	Malaysia	New Zealand	Philippines	Singapore	Taiwan	Thailand
37 UEENEEE00 2B - Dismantle, assemble and fabricate electro-technology components	Be able to understand and draw simple single phase and three phase electrical line and layout diagrams	No information available for this level qualification	Perform Single Phase Layout Drawing	15845 - Draw and explain simple electrical diagrams	CON724201 - Prepare construction materials and tools	EE3004PR - M8 Electrical Drafting	No information available for this level qualification	Interpret and technical drawing and select appropriate industrial material.
UEEENEE00 5B - Fix and secure equipment	Be able to perform simple cable jointing, cable termination and electrical installation work		Perform Single Phase Single Line Drawing	15849 - Perform manual soldering and de-soldering procedures for electro-technology work	CON311202 - Interpret technical drawings and plans			Interpret and draw the electrical drawing.
UEEENEE00 7B - Use drawings, diagrams, schedules and manuals			Perform Three Phase Layout Drawing	15854 - Draw and interpret electrical diagrams	CON311203 - Perform mensurations and calculations			Design electrical drawing systems using CAD
			Perform Three Phase Single Line Drawing	16407 - Use and maintain hand and power tools for electrical work	CON311204 - Maintain tools and equipment			Perform in electrical welding gas welding , and metal fabrication.
			Perform Three Phase Wiring Drawing		CON724308 - Prepare electrical power and hydraulic tools			Adjustment, modification and metal forming with hand tools.

# Basic Electrical Principles

<b>Australia</b>	UEENEE00 3B - Solve problems in extra-low voltage single path circuits	UEENEE00 4B - Solve problems in multiple path d.c. circuits	UEENEEG00 1B - Solve problems in electro-magnetic circuits	<b>Hong Kong SAR</b>	Be able to understand the principle and function of basic circuit elements including resistance, inductance, capacitance, single-phase transformers, starconnected and delta-connected systems	Be able to apply knowledge of basic electrical circuit theories to electrical work	Be able to perform electrical measurement with understanding	<b>Indonesia</b>	Electricity Basic Theories	Measuring Gauges and Electrical Measurement		<b>Malaysia</b>	No information available for this level qualification		<b>New Zealand</b>	750 - Demonstrate knowledge of electrical test instruments and take measurements	15843 - Demonstrate knowledge of magnetism and electricity		<b>Philippines</b>	No information available for this level qualification		<b>Singapore</b>	EE2001PA - M1 Electrical Principles		<b>Taiwan</b>	No information available for this level qualification		<b>Thailand</b>	Assemble, test a basic electrical and electronic equipment circuits	Analyze electrical circuits using electrical theories	Control electrical equipment using controller	Fix and produce electrical and electronic equipment	Fix and produce electrical and electronic equipment.
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# Occupational Safety and Health

<b>Australia</b>	UEENEEE00 1B - Apply OHS practices in the workplace	UEENEEE03 3B - Document occupational hazards and risks in electrical	
<b>Hong Kong SAR</b>	Be able to observe and follow workplace safety and health	Be able to understand and apply good electrical safety practices in work	Be able to comply with prevailing occupational, safety and health related legislation
<b>Indonesia</b>	Work Safety & Health		
<b>Malaysia</b>	No information available for this level qualification		
<b>New Zealand</b>	1178 - Follow safe practices in an electrical workplace	15848 - Demonstrate knowledge of safeguards for use with portable electrical appliances	15851 - Demonstrate knowledge of electrical safety and safe working practices for electrical workers  6401 - Provide first aid  6402 - Provide resuscitation level 2
<b>Philippines</b>	500311108 - Practice occupational health and safety procedures		
<b>Singapore</b>	No information available for this level qualification		
<b>Taiwan</b>	No information available for this level qualification		
<b>Thailand</b>	No information available for this level qualification		

# Testing and Compliance

<p><b>Australia</b></p> <p>UEENEEG00 5B - Verify compliance and functionality of general electrical installations</p>	<p><b>Hong Kong SAR</b></p> <p>Be able to use multi-meters and multi-function testers (insulation, continuity, polarity, earth loop impedance and earth leakage tests) for electrical measurement and testing</p>	<p><b>Indonesia</b></p> <p>No information available for this level qualification</p>	<p><b>Malaysia</b></p> <p>Carry Out Single Phase Continuity Test</p> <p>Carry Out Single Phase Polarity Test</p> <p>Carry Out Single Phase Insulation Test</p> <p>Carry Out Single Phase Earthing Test</p> <p>Carry Out Single Phase Residual Current Circuit Breaker Test</p> <p>Carry out Single Phase Loop Test</p>	<p><b>New Zealand</b></p> <p>Describe and use complex electrical instruments</p> <p>Test electrical appliances for safety</p> <p>Demonstrate procedures for examination and testing of electrical installations</p> <p>Inspect and test an electrical installation for compliance with AS/NZS 3000:2000</p> <p>Demonstrate knowledge of, and apply electrical legislation, codes of practice, and standards</p>	<p><b>Philippines</b></p> <p>No information available for this level qualification</p>	<p><b>Singapore</b></p> <p>EE3002PAM6 Electrical Power &amp; Equipment</p>	<p><b>Taiwan</b></p> <p>No information available for this level qualification</p>	<p><b>Thailand</b></p> <p>Measure and test electrical circuits</p> <p>Test and analyse characteristics of electrical machines</p> <p>Test electrical machines</p>
<p>Be able to perform standard functional checks on electrical installation</p>		<p>Be able to comply with test specifications and regulations required for a completed installation, major alteration of existing installation and periodic inspection</p>		<p>Be able to understand the various testing methods and commissioning tests on different types of electrical installations (e.g., transformers, generators, motors, cables/overhead lines, capacitors, switchgears, protective devices)</p>				

# Wiring Installation and Design

<b>Australia</b>  UEENEEG00 8B - Lay wiring and terminate accessories for extra-low voltage circuits	UEENEEG00 3B - Install wiring and accessories for low voltage circuits	UEENEEG00 7B - Select and arrange equipment for general electrical installations	UEENEEG00 9B - Develop and connect control circuits	<b>Hong Kong SAR</b>	Be able to comply with electrical wiring regulations and standards in works	Be able to estimate loading demand and apply appropriate circuit arrangement for the installation	Be able to understand and appreciate the local earthing system characteristic s and be able to implement the required earthing arrangement	<b>Indonesia</b>	General requirements of Electrical Installations	Distribution Installations	Transmission Installations	<b>Malaysia</b>	Carry out Single Phase Surface and Concealed Wiring	Carry out Single Phase Conduit and Trunking Wiring	Install Distribution Board	Install Domestic Earthing System	Carry out Three Phase Concealed Wiring	Carry out Three Phase Conduit Wiring	Carry out Three Phase Cable Tray / Trunking Wiring	<b>New Zealand</b>	15844 - Select and install flexible cords	15852 - Isolate and test low voltage electrical subcircuits	20961 - Demonstrate knowledge of special electrical installation	1204 - Demonstrate knowledge of earthing	2016 - Install earthing systems for multiple earthed neutral installations	<b>Philippines</b>	ON724309 - Perform roughing-in activities for communication and distribution systems	CON724310 - Install wiring devices for floor and ground fault current interrupting outlets	CON724311 - Install electrical protection system for lighting and grounding	CON724312 - Install electrical lighting systems on auxiliary outlets and lighting fixtures	<b>Singapore</b>	EE2002PA - M2 Electrical Installations	EE3002PAM6 Electrical Power and Equipment	EIN-001-3-0101 - Install and operate lighting and earthing system	EIN-003-2-0101 - Install external lighting system	EIN-004-2-0101 - Conduct cable fault location for distribution cables	<b>Taiwan</b>	No information available for this level qualification	<b>Thailand</b>	Design electrical system using computer	Install electrical equipment following the blueprint	Inspect, maintain and repair electrical systems	Install interior electrical system	Design and install electrical systems
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# Electrical Equipment Installation

<b>Australia</b>	UEENEEG00 4B - Install low voltage electrical apparatus and associated equipment	UEENEEG00 8B - Find and repair faults in electrical apparatus and circuits	
<b>Hong Kong SAR</b>	Be able to understand the principle and demonstrate the application of operations and characteristics of different types of power transformers	Be able to understand the principle of operations and the characteristics of starting methods of different types of electrical machines including synchronous machines, induction machines, DC machines; and their applications	
<b>Indonesia</b>	Electrical Machines (AC and DC)	Lighting Installation	Industrial Installations
<b>Malaysia</b>	Install Direct Current Motors	Install Low Voltage Generator	Install Sub-Switch Board  Install Low Voltage Motor Control Centre  Maintain DC System  Maintain Electrical Installation
<b>New Zealand</b>	Direct Current Motors 1174 - Disconnect and reconnect fixed wired electrical appliances or equipment	1192 - Fault-find, repair, and test portable electrical tools and appliances	16411 - Fault-find, repair, and re-commission fixed-wired electrical appliances  1205 - Demonstrate knowledge of electrical switchboards  1710 - Demonstrate knowledge of electric lighting
<b>Philippines</b>	No information available for this level qualification		
<b>Singapore</b>	EE2004PR - M4 Electric Machines	EIN-005-2-0101- Maintain emergency discharge lighting system	
<b>Taiwan</b>	No information available for this level qualification		
<b>Thailand</b>	Install electrical machines following the blueprint	Control electrical machines using electronic controller	Fix and maintain electrical machines  Test characteristics of DC electrical machines  Repair, maintain and test AC electrical machines

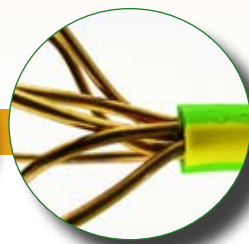
# Workplace Communication

<b>Australia</b> UEENECC02 0B - Participate in electrical work and competency development activities UEENECC00 1B - Maintain documentation UEENECC00 2B - Source and purchase material/parts for installation or service jobs UEENECC00 3B - Provide quotations for installation or service jobs UEENECC01 0B - Deliver a service to customers	<b>Hong Kong SAR</b> Be able to complete standard technical report and work records required under law Be able to perform simple material and labor costing for installation work Be able to understand the relevant labor laws in rights, obligations and responsibilities Be able to uphold quality and professional ethics in work Be able to participate and contribute in team work.	<b>Indonesia</b> Supervision competence standards for Low Voltage Installations for users: <ul style="list-style-type: none"> <li>• Management</li> <li>• Leading Teamwork</li> <li>• Organising Tasks</li> <li>• Scheduling Implementation</li> <li>• Network Planning and Resources</li> <li>• Presenting Ideas</li> </ul>	<b>Malaysia</b> Schedule Subordinates Activities Carry Out Distribution Conduct Unit Meeting Prepare Unit Budget Prepare Staff Appraisal Monitor Log Book On Work Activities Prepare Accident Report	<b>New Zealand</b> 1978 - Identify basic employment rights and responsibilities, and sources of information and assistance 21766 - Demonstrate knowledge of theory for registration of electricians 1277 - Communicate information in a specified workplace 3492 - Write a short report	<b>Philippines</b> 500311105 - Participate in workplace communication 500311106 - Work in a team environment 500311107 - Practice career professionalism CON311201 - Observe procedures, specifications and manuals of instruction	<b>Singapore</b> Life skills for personal development Life skills at the workplace	<b>Taiwan</b> No information available for this level qualification	<b>Thailand</b> Communicate using Thai, English and other languages in daily life and career. Develop oneself and society according to the principles of religions, human rights, culture and economics Develop oneself and career. Solve problems by using the scientific and process mathematics Manage, control and develop one's quality of work
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# Section Four

## Asia-Pacific Skills Mapping Project





## Key Findings and Conclusions

It would appear that most of the participating FAPECA countries and regions have some essentials of the Australian training system, including a Qualifications Framework (or qualifications system) and a quality assurance mechanism. The different Qualifications Framework provide a basis for improving the quality, accessibility, linkages and public or labour market recognition of qualifications.

Employer and industry consultation is an integral part of each FAPECA member's vocational education and training system, and this industry involvement generally continues on an ongoing basis. Industry involvement is a key element for this project and is essential if agreement is to be reached on minimum regional training standards for the electrotechnology industry.

In most FAPECA countries and regions, qualifications and competency standards are developed nationally, with training programmes, courses, training materials and other resources being developed on a local level by training organisations and other relevant stakeholders. In any case, there are both formal and informal processes in place to determine how training products and materials are developed.

The fact that the vocational education and training systems can be compared across the ten FAPECA countries and regions illustrates that it is also possible to compare qualifications.

There is a diverse role undertaken by the electrician throughout South East Asia.

The differing job roles, training requirements, workplace standards, codes of practice and regulations have seen the role vary from country to country. The regions that have a structured training program and workplace competency standards, and those that are developing these, get a greater diversity and breadth of work activities from the electrician job role compared to those that base work experience and knowledge training, after work activity, as the method of training. The former structured training method would be the preferred option when selecting a common and consistent training regime for the region.

Work activities are greatly influenced by regulations, work standards and codes of practice.

The differences across the region make it impossible to map one area to another and to allow easy transportation of skills and employment throughout the region. The adoption of uniform workplace competency standards, common electricity work standards and requirements along with common codes of practice and work methods would see a far greater cooperation between the workforces within the region.

## Lessons Learnt

Some of the lessons learnt to date include:

- There are key elements in common in each country or region's vocational education and training system.
- The important role regulators play in the development and review of qualifications and the difference this has in the training systems of each country.
- The issue of heavy industry regulation is further complicated by which set of international standards are used by the respective governments and their compatibility.
- Australia has a fundamentally different standard of entry into the electrical and communications industry with all electricians being required to undertake the standard Australian Apprenticeship.

The differences across the region make it impossible to map one area to another and to allow easy transportation of skills and employment throughout the region, although there are key elements in common in each country or region's vocational education and training system.



- The relationship between Higher Education and Vocational Education and Training and articulation arrangements between the two sectors.
- The issue of industry leadership has been an important consideration when comparing systems.

## Next Step: Where to From Here?

This report will be circulated to all members of FAPECA and the large number of other organizations who participated in the project. The extensive work undertaken is a credit to the industry and governments across the region.

The competency and skills matrix will need to be validated with industry organisations, government bodies and participating FAPECA members with the objective of gaining agreement on minimum regional training standards for the industry. This process will not lead to the diminution of any of the country standards set by industry and government in each country. However, the actual skills required are common across all countries and there is considerable room to ensure that each country is incorporating similar skill requirements in their training arrangements.

The best outcome would be the agreement by industry on a common set of competencies within a regional skills Framework. The outcome is not dependent upon any country determining how their arrangements apply across the region or suggests that any one country has the better competency or training framework.

This adoption of a common Framework would:

- allow for increased movement across the Asia Pacific region of skilled workers, with clearer parameters for learning the legislative and other knowledge based requirements for each particular country or territory;
- contribute towards building up the skill base in each country across the entire region for companies operating across borders;
- assist providers in clarity of outcomes across international borders;
- allow for increased co-operation by companies and industry of skill and labour requirements; and
- better position the industry to compete for skilled labour with other industries and areas of the world.

The approach taken and the methodology utilised for the Overseas Skills Mapping Project is not only relevant to the electrotechnology industry in the Asia-Pacific region, but can also be transferred to other industry sectors and/or regions where skills shortages are being experienced.

The emphasis of this project is not, and never has been, on Australian skilled migration. Rather it is on the establishment of a competency and skills matrix that can be validated and implemented across the region. This will benefit all of the FAPECA members participating in the project, as well as industry organisations and government bodies. It will pave the way for an increasing number of partnerships between countries and regions.

Discussions at the May 2008 FAPECA meeting have suggested that another member country may take over the leadership of the initiative from Australia in order to gain agreement on the framework and address implementation and other issues. This would be an important step in cementing the Framework for the good of the industry, Asia Pacific and its citizens.

The best outcome would be the agreement by industry on a common set of competencies within a regional skills framework. The outcome is not dependent upon any country determining how their arrangements apply across the region or suggests that any one country has the better competency or training framework.

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