



# ASEAN Ballast Market Assessment Report



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## Acronyms

<b>AFTA</b>	Asian Free Trade Area
<b>APERLINDO</b>	Indonesian Electrical Lighting Industry Association
<b>ASE</b>	Alliance to Save Energy
<b>ASEAN</b>	Association of SouthEast Asian Nations
<b>BLC</b>	Ballast Efficacy Factor
<b>BLF</b>	Ballast Lumen Factor
<b>BPC</b>	Berakas Power Company Sdn. Bhd. (Brunei Darussalem)
<b>BSN</b>	Badan Standardisasi Nasional (Indonesia)
<b>CELMA</b>	European Lighting Manufacturer's Association
<b>CENELEC</b>	European Committee for Electrotechnical Standardization
<b>CEPT</b>	Common Effective Preferential Tariff
<b>CFLs</b>	Compact Fluorescent Lamps
<b>CLASP</b>	Collaborative Labeling and Appliances Standards Program
<b>CPRU</b>	Construction Planning and Research Unit (Brunei Darussalem)
<b>DEDE</b>	Department of Alternative Energy Development and Efficiency (Thailand)
<b>DEDP</b>	Department of Energy Development and Promotion (Thailand)
<b>DES</b>	Department of Electrical Services (Brunei Darussalem)
<b>DGEEU</b>	Directorate General of Electricity and Energy Utilization (Indonesia)
<b>DOE</b>	Department of Energy (Lao)
<b>DSM</b>	Demand Side Management
<b>EAC</b>	Electricity Authority of Cambodia
<b>ECMP</b>	Feasibility Study for Energy Conservation Model Project (Myanmar)
<b>EdC</b>	Electricite du Cambodge (Cambodia)
<b>EE&amp;C SSN</b>	Energy Efficiency and Conservation Sub-Sector Network
<b>EEC</b>	Energy Efficiency and Conservation
<b>EI</b>	Electrical and Electronics Institute (Thailand)
<b>EELS</b>	Energy Efficiency Labeling Scheme
<b>EGAT</b>	Electricity Generating Authority of Thailand
<b>ENCON</b>	Energy Conservation
<b>EPPO</b>	Energy Planning and Policy Office (Thailand)
<b>ERWG</b>	End-Use Energy Rating Work Group
<b>EVN</b>	Electricity of Vietnam
<b>GDP</b>	Gross Domestic Product
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	Greenhouse gas
<b>GW</b>	Gigawatt
<b>GWh</b>	Gigawatt hours
<b>HID</b>	High-Intensity Discharge
<b>HPO</b>	Hydropower Office (Lao)
<b>Hz</b>	Hertz
<b>IEC</b>	Institute for Energy Conservation
<b>IIEC</b>	International Institute for Energy Conservation
<b>IPPs</b>	Independent Power Producers
<b>ISC</b>	Industrial Standards of Cambodia
<b>ISO</b>	International Standards Organization
<b>JBE</b>	Department of Electricity and Gas Supply (Malaysia)
<b>JTK</b>	Jasa Teknik Kelistrikan (Indonesia)
<b>KAN</b>	Komite Akreditasi Nasional (Indonesia)
<b>kWh</b>	kilowatt hours
<b>LATL</b>	Lighting & Appliance Testing Laboratory (Philippines)
<b>LNCE</b>	Lao National Committee for Energy
<b>MAC</b>	Malaysian Accreditation Council

<b>MEA</b>	Metropolitan Electricity Authority (Thailand)
<b>MEPS</b>	Minimum Energy Performance Standards
<b>MEWC</b>	Ministry of Energy, Water and Communications (Malaysia)
<b>MIH</b>	Ministry of Industry and Handicrafts (Lao)
<b>MIME</b>	Ministry of Mines and Energy (Cambodia)
<b>MOC</b>	Ministry of Construction (Vietnam)
<b>MOST</b>	Ministry of Science and Technology (Vietnam)
<b>MRA</b>	Mutual Recognition
<b>MS</b>	Malaysian Standard
<b>MW</b>	Megawatt
<b>MWh</b>	Megawatt hours
<b>NEA</b>	National Energy Agency (Singapore)
<b>NEEC</b>	National Energy Efficiency Committee (Singapore)
<b>NEPC</b>	National Energy Policy Committee (Thailand)
<b>NEPO</b>	National Energy Policy Office (Thailand)
<b>NGO</b>	Non-Government Organization
<b>OEMs</b>	Original Equipment Manufacturers
<b>PDR</b>	People's Democratic Republic (Lao)
<b>PEA</b>	Provincial Electricity Authority (Thailand)
<b>PLN</b>	Persero Jasa Teknik Kelistrikan (Indonesia)
<b>PT PLN</b>	National Electric Power Limited (Indonesia)
<b>RAC</b>	Room Air-Conditioners
<b>RED</b>	Rural Electrification Division
<b>RIKEN</b>	National Energy Conservation Master Plan (Indonesia)
<b>S&amp;L</b>	Standards and Labeling
<b>SAC</b>	Singapore Accreditation Council
<b>SEC</b>	Singapore Environment Council
<b>SESCO</b>	State of Sarawak Power Company (Malaysia)
<b>SGLS</b>	Singapore Green Labeling Scheme
<b>SINGLAS</b>	Singapore Laboratory Accreditation Scheme
<b>SNI</b>	Standar Nasional Indonesia
<b>SPRE</b>	Southern Provincial Rural Electrification (Lao)
<b>SPRING</b>	Standards, Productivity and Innovation for Growth (Singapore)
<b>STAMEQ</b>	Directorate for Standards and Quality (Vietnam)
<b>STEA</b>	Science Technology and Environment Agency (Lao)
<b>TCPHEA</b>	Technical Committee on Performance of Households and Similar Electrical Appliances
<b>TCVN</b>	Vietnam Standards
<b>TEI</b>	Thailand Environment Institute
<b>TIS</b>	Thai Industrial Standards
<b>TISI</b>	Thai Industrial Standards Institute
<b>TNB</b>	Peninsular Malaysia Power Company
<b>UNDP</b>	United Nations Development Program
<b>UNSD</b>	United Nations Statistics Division
<b>US\$</b>	United States Dollars (currency)
<b>USAID</b>	United States Agency for International Development
<b>VEEPL</b>	Vietnam Energy Efficient Public Lighting Program
<b>VILAS</b>	Vietnam Laboratory Accreditation Scheme
<b>VINASTAS</b>	Vietnam Standard and Consumers Association

# Executive Summary

## ***Introduction***

The Association of Southeast Asian Nations (ASEAN) is a political, economic, and cultural organization of countries located in Southeast Asia. It aims to foster cooperation and mutual assistance among members. ASEAN represents about 8% of the world's population and its combined GDP in 2003 was around US\$700 billion. ASEAN's GDP is forecasted to grow at an average rate of about 4-5% per year for over the next five years.<sup>1</sup>

ASEAN member countries are culturally and economically diverse. Among other member countries, Singapore has a very high GDP per capita of about US\$23,000 (2003) which surpasses many Western nations, while Cambodia and Lao PDR have a low GDP per capita of only about US\$1,700. Economic principles in ASEAN range from market-based to socialism-in-transition with electronic goods, oils, and wood as major products.

Geographical and economical diversifications, however, do not hinder the cooperation on energy efficiency in the region, as ASEAN member countries have underlined the development of an energy efficiency standards and labeling program for ASEAN as one of the key regional energy efficiency development strategies. As a result of this cooperation, ASEAN initiated the ASEAN Regional Standards and Labeling Program (ASEAN S&L) in 1999 and cited fluorescent lamp ballasts as a priority product for immediate action. The ASEAN Energy Efficiency and Conservation Sub-Sector Network (EE&C-SSN) was given the mandate by the ASEAN Energy Ministers to develop and implement the ASEAN S&L program.

## ***Scope of Market Assessment***

This market assessment report aims to provide standards and labeling stakeholders in the ASEAN region with an overview on the demand and supply characteristics of fluorescent lamp ballasts in ASEAN. More detailed information with respect to the domestic ballasts market in each member country are discussed in the report as is information on the key public and private sector organizations, ballast standards in place, and the relevant energy conservation initiatives of each country. Moreover, the report demonstrates the potential for electricity peak demand reduction and energy savings due to forecasted penetration of energy-efficient fluorescent lamp ballasts in the region.

The findings and recommendations summarized in this market assessment report are intended to facilitate the development of the ASEAN S&L program on fluorescent lamp ballasts, particularly with regard to establishing a common energy performance test procedure for fluorescent lamp ballasts and other core technical elements necessary for implementation of such a regional S&L program.

## ***Major Findings***

### **Demand Characteristics**

The total fluorescent lamp ballast market size in the ASEAN region is around 100 million units per annum<sup>2</sup>. Indonesia is the largest fluorescent lamp ballast market, consuming around 50 million units per year, followed by Thailand at about 20 million units per year. Malaysia

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<sup>1</sup> Based on numbers reported by Asian Development Bank (ADB)

<sup>2</sup> Based on survey questionnaires and expert interviews

and the Philippines have similar markets, about 10 million units per year. Ballast consumption in Vietnam, Lao PDR, Myanmar, and Cambodia is still limited, partly due to their low electrification rates and proliferation of cheaper, low-efficiency incandescent lamps.

Of the three major types of fluorescent lamp ballasts consumed in the ASEAN region (i.e., standard electromagnetic, low watt loss electromagnetic and electronic) standard electromagnetic ballasts are the most popular, mainly due to lower purchasing prices compared with their energy-efficient counterparts. Standard electromagnetic ballasts occupy the largest marketshare--around 90% of the regional consumption. The current marketshare of low watt loss electromagnetic ballasts is estimated to be 7-10%. However, after efficient lighting promotional efforts in several ASEAN member countries, the low watt loss electromagnetic ballast marketshare has gradually increased. Electronic ballasts are not widely used in the region, due to their much higher first-cost and questionable reliability. The current marketshare is estimated to be only 1-3%.

### **Supply Characteristics**

Fluorescent lamp ballast supply in the ASEAN region is met by manufacturing capacity within the region and import from other regions. It is difficult to determine the exact number of ballast manufacturers and their actual production capacity since there are a number of small non-registered manufacturers in the region. However, manufacturer surveys and expert interviews reveal that there are at least 80 fluorescent lamp ballast manufacturers spread among five member countries (i.e., Indonesia, Malaysia, Philippines, Thailand, and Vietnam). The annual regional production capacity is estimated at 90 to 110 million units. Standard electromagnetic ballasts have the largest production share, corresponding to domestic and regional demand. Indonesia has the largest local manufacturing capacity, primarily serving domestic demand of 40 to 50 million units per annum. Thailand is the second largest manufacturing base with a capacity of around 30 million units per annum.

ASEAN member countries' combined annual export is around 18 million units.<sup>3</sup> Half of which is traded among ASEAN member countries and the remaining 50% exported to other regions. Although the manufacturing capacity within the region is capable of meeting the regional demand, about 10 million units of imported ballasts are required annually to offset the shortfall created by exports to non-ASEAN countries. Thailand is the largest ballast exporter in the region.

### **Product Standards**

There is no internationally-recognized energy performance test standard for fluorescent lamp ballasts. Similarly, none of the ASEAN member countries have developed or implemented their own versions of such a standard. Most energy conservation programs promoting energy-efficient ballasts in ASEAN measure and calculate ballast energy performance based on parameters obtained from measurement according to the IEC standards for fluorescent lamp ballasts.

Only six ASEAN member countries (i.e., Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) have set and regulated safety requirements for fluorescent lamp ballasts. For countries where national standards related to fluorescent lamp ballasts do not exist, they are potentially at risk for poor quality product dumping due to the fact that all

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<sup>3</sup> Statistical data for ballasts for discharge lamps or tubes

ballasts domestically produced and imported into the country are unlikely to be tested by the proper accredited test laboratories.

### **Potential Benefits**

With the introduction of a regional energy standards and labeling program on fluorescent lamp ballasts complemented by manufacturers' support and a public awareness campaign to promote efficient lighting, ASEAN could potentially save between 100 MW to 200 MW in peak demand over a ten-year period. The corresponding reduction in energy consumption is estimated to be 900GWh to 2,000 GWh over the same period.

### **Challenges Ahead**

To achieve the successful promotion of the regional S&L program for fluorescent lamp ballasts in the ASEAN region, it is necessary for the ASEAN EE&C-SSN, as the implementing agency, to focus on proper planning as well as strengthening existing collaboration among relevant bodies at national and regional levels.

Even if significant progress has been made in an effort to move forward the ASEAN S&L program for fluorescent lamp ballasts, one of the key barriers that could hinder proper planning and further development of the ASEAN S&L program is the informational barrier. In addition to that, the different development levels of the related regulatory frameworks and product standards for fluorescent lamp ballasts could potentially prohibit expansion and penetration of the regional program toward the national level. The differences in maturity of energy conservation or energy efficiency programs in each member country are also potential barriers to collaboration of the regional S&L efforts.

The other challenges in pursuing the energy efficiency improvement of fluorescent lamp ballasts in the ASEAN region include short-term and long-term funding to support the ASEAN S&L Program.

### **Key Recommendations**

To accelerate the development of a sustainable regional S&L program for fluorescent lamp ballasts in ASEAN, the following steps are recommended:

- Establish a mechanism to track ballast trade data in each ASEAN member country and categorize ballasts for discharge lamps (or tubes) in a sub-category for fluorescent lamp ballasts
- Conduct a detailed study on the energy efficiency profiles of various types of fluorescent lamp ballasts in each member country and the region
- Conduct a detailed feasibility study that includes market surveys on the supply chain, customer awareness and preferences, fluorescent lamp ballasts saturation, and ballast usage profiles
- Conduct a feasibility study on the market impact of the establishment of product standards for fluorescent lamp ballast in member countries where standards for fluorescent lamp ballasts do not exist. The study should indicate, for example, energy saving potential, changes in supply and demand mechanisms, etc.
- Following the feasibility study, national standards and accreditation bodies should be established.

- Accredited testing laboratories in those member countries should be considered to be established (if laboratory Mutual Recognition Agreements (MRAs) are not viable options)
- Develop the regional S&L program in a complementary manner to national energy efficiency programs in each country
- Consider other funding mechanisms (for instance, the Kyoto Protocol) as vehicles to move the energy efficiency improvement of fluorescent lamp ballasts in the region forward

# **Chapter 1: ASEAN Fluorescent Lamp Ballasts Market**

## **1.1 Introduction**

The Association of Southeast Asian Nations (ASEAN) is a political, economic, and cultural organization of countries located in Southeast Asia. The ASEAN was established in 1967 by five founding member countries: Indonesia, Malaysia, Philippines, Singapore and Thailand with the objectives to foster cooperation and mutual assistance among members. Other Southeast Asian nations (including Brunei Darussalam, Cambodia, Lao PDR, Myanmar, and Vietnam) later joined the association and now ASEAN encompasses all countries in Southeast Asia. Since East Timor's independence in May 2002, the ASEAN has been more accommodating of the new nation. East Timor has already been invited to several ASEAN meetings. However, East Timor is still an observer nation in the ASEAN.

Following the ASEAN meeting on October 7, 2003 in Bali, Indonesia, ASEAN agreed to achieve closer economic integration in 2020 by the establishment of the ASEAN free trade area mainly for serving the population of 550 million whose annual trade is US\$ 720 billion. During the same meeting, the People's Republic of China and ASEAN agreed to work faster toward a mutual trade agreement, which will create the world's most populous market of 1.7 billion consumers. Similarly, Japan signed an agreement pledging to reduce tariff and non-tariff barriers with ASEAN members.

As an international effort in utilizing their limited energy resources more efficiently, ASEAN member countries decided to develop a common energy performance test procedure for fluorescent lamp ballasts. This procedure is expected to be introduced as a voluntary testing standard in the regional energy standards and labeling schemes. However, the final performance measurement methodology has yet to be decided. This report represents the preliminary assessment of the market towards harmonization.

## **1.2 Regional Key Characteristics**

### **Overview**

In 2003, there were 550 million people in ASEAN member countries, representing about 8% of the world's population with a combined GDP of US\$700 billion (roughly equivalent to South Korea). The economies of member countries of ASEAN are diverse, with GDP per capita (Purchasing Power Parity - PPP) ranging from as high as US\$23,700 (Singapore) to as low as US\$1,700 (Cambodia and Lao PDR). Approximately 30-40% of the population in Cambodia, Lao PDR and Myanmar are living under the poverty line and more than 80% still live in rural areas. Economic principles in ASEAN range from market-based to socialism-in-transition.

The ASEAN member countries are also culturally diverse and include more Muslims than any other religious entities (about a quarter of a billion) mostly in Indonesia and Malaysia. Other main religions in the region include large numbers of Buddhists throughout the region and a predominantly Catholic populace in countries like the Philippines. Diversity of ASEAN member countries is illustrated in the basic information on geographical areas, populations, economies, and energy consumption as shown in Table 1.

**Table 1: General Information on ASEAN Member Countries**

Country	Geography (sq.km.)	Population	Electricity Consumption (GWh/year)	Economy (GDP per Capita, US\$)
Brunei Darussalam	5,770	365,251	2,322	18,600
Cambodia	181,040	13,363,421	110.6	1,700
Indonesia	1,919,440	238,452,952	89,080	3,200
Lao PDR	236,800	6,068,117	824.8	1,700
Malaysia	329,750	23,522,482	68,400	9,000
Myanmar	678,500	42,720,196	5,709	1,900
The Philippines	300,000	86,241,697	42,040	4,600
Singapore	692.7	4,353,893	28,350	23,700
Thailand	514,000	64,865,523	90,910	7,400
Vietnam	329,560	82,689,518	27,710	2,500
<b>Total</b>	<b>4,495,553</b>	<b>562,643,050</b>	<b>355,456</b>	-

Source: <http://www.cia.gov/cia/publications/factbook/>

## Power Industry

Electricity in ASEAN member countries is generated from different supplies using various technologies. Fossil fuel (such as natural gas) is the main supply for electricity generation in Brunei Darussalam, Cambodia, Indonesia, Malaysia, Philippines, Singapore and Thailand. In Myanmar, electricity generated from fossil fuel equals the electricity generated from hydro-power plants, accounting for about 88 percent of the total electricity produced. Electricity supplies in Lao PDR and Vietnam are mainly generated by hydropower plants, representing 98% and 56% of total electricity, respectively. Table 2 illustrates the average electricity price in ASEAN member countries

**Table 2: Average Electricity Selling Price (US cents/kWh) in ASEAN Member Countries (September 2003).**

Country	Currency Exchange per 1.00 US\$	Residential	Commercial	Industrial
Brunei Darussalam	1.73370 BND (Brunei Dollars)	2.88-14.42	2.88-11.54	2.88-11.54
Cambodia	3,815.80 KHR ( Riels)	9.17-17.03	15.72-17.03	12.58-15.72
Indonesia	8,430.84 IDR (Rupiah)	1.69-4.60	2.77-5.65	1.71-4.38
Lao PDR	7,562.00 LAK (Kips)	0.55-3.8	4.18-5.22	3.51
Malaysia	3.80000 MYR (Ringgits)	5.53-8.94	2.63-10.52	2.63-10.52
Myanmar	6.00122 MMK (Kyats)	8.14	8.14	8.14
Philippines	55.1100 PHP ( Pesos)	3.15-10.71	3.68-9.85	3.35-10.84
Singapore	1.73384 SGD (Singapore Dollars)	9.23	4.42-7.18	4.16-6.69
Thailand	39.8414 THB (Baht)	3.41-7.47	2.94-7.47	2.94-7.13
Vietnam	15, 537.00 VND (Dong)	2.92-8.17	4.24-13.96	2.83-13.96

Source: [http://www.aseanenergy.org/publications\\_statistics/electricity\\_database/electricity-database.htm](http://www.aseanenergy.org/publications_statistics/electricity_database/electricity-database.htm)

Electricity consumption in ASEAN member countries was 355 billion kWh in 2001. In terms of electricity consumption per capita, Singapore and Brunei Darussalam consume more than 6 MWh per capita while Cambodia consumes as low as 0.009 MWh per capita. A broad spectrum of electricity consumption per capita in the region, shown in Table 3, could roughly represent different levels of electrification, electricity distribution, electrical appliances usage, and people's standard of living among member countries.

**Table 3: Installed Capacity and Household Electrification Rate**

Country	Installed Capacity (MW) <sup>*1</sup>	Electricity Consumption per Capita (MWh) <sup>*2</sup>	Electrification Rate
Brunei Darussalam	706.5	6.757	100%
Cambodia	200	0.009	15%
Indonesia	20,762	0.390	83% <sup>*3</sup>
Lao PDR	642	0.146	40%
Malaysia	15,838 (2003)	2.856	93% <sup>*4</sup>
Myanmar	1,200	0.136	10%
Philippines	14,000	0.507	88%
Singapore	6,600	6.592	100%
Thailand	25,378 (2003)	1.471	>98%
Vietnam	8,860 (2002)	0.347	81%

Note: \*1 Installed Capacity as of 2000 otherwise stated.

\*2 Electricity Consumption Per Capita as of 2001

\*3 Rural Electrification rate as of 1999

\*4 The Peninsular area (100%), Sabah (75%) and Sarawak (80%)

### 1.3 Regional Ballast Market Overview

Fluorescent lamp ballasts in this report refer to electromagnetic and electronic ballasts which are used for tubular and circular fluorescent lamps. Tubular fluorescent lamps available in the ASEAN are of the 18, 20, 36 and 40-watt types while the most popular circular fluorescent lamp is the 32-watt model. By energy performance, fluorescent lamp ballasts in the ASEAN region can be categorized into three major groups:

- 1) Standard Loss Electromagnetic Ballasts
- 2) Low Watt Loss Electromagnetic Ballasts
- 3) Electronic Ballasts

Standard electromagnetic ballasts have about 8 to 10 watts lost per unit. Low watt loss electromagnetic ballasts, with better silicon-steel and lower resistance conductors have about 5 to 7 watts per each. Electronic ballasts are the most energy efficient ballasts available for fluorescent lamps with losses typically less than 4 watts.

The total fluorescent lamp ballast market size in the ASEAN region is about 100 million units per annum. Indonesia is the largest fluorescent lamp ballast consumer, using 50 million units per year, followed by Thailand at about 20 million units per year. Malaysia and the Philippines have similar sized markets (about 10 million units per year). Ballast consumption in Vietnam, Lao PDR, Myanmar, and Cambodia is limited, partly due to their low electrification and proliferation of cheaper, low-efficiency incandescent lamps.

Standard electromagnetic ballasts have enjoyed the largest marketshare (90%) of the region. This marketshare is expected to be steady for the next few years, even though there are a number of energy conservation programs promoting energy efficient lighting technologies in the region. Were this to be the case, it seems likely it would be mainly due to the lower price of electromagnetic ballasts compared with other technologies. For example, an electromagnetic ballast costs slightly more than half of the low watt loss model and is 5 to 8 times cheaper than an electronic ballast.

Low watt loss electromagnetic ballasts are normally included as one of the most popular energy efficient lighting technologies found in various government and private sector energy conservation initiatives. As a result, low watt loss electromagnetic ballasts have gradually increased their marketshare in the region, particularly in Malaysia and Thailand, due to more competitive prices. Presently, the marketshare of low watt loss electromagnetic ballasts is estimated to be 7 to 10% of the regional ballast consumption.

Since electronic ballasts are not well-used in the region, the current marketshare is estimated to be only 1 to 3%. Quality, reliability, and price of electronic ballasts are key concerns for most buyers. Low quality and reliability of electronic ballasts contribute to the increasing harmonic distortion in the electricity distribution systems which results in shorter lifetimes for the lamps and damage to other electronic appliances connected to the distribution system.

### **1.4 Regional Ballast Trade Flow**

Statistical data on ballasts in most ASEAN member countries typically groups import and export ballasts into one category, called the “Ballasts for Discharge Lamps or Tubes”, which generally include ballasts for High Intensity Discharge (HID) lamps, Compact Fluorescent Lamps (CFLs), and fluorescent lamps. Thailand is only country in the region dividing such category into two sub-categories: 1) ballasts for fluorescent lamps and 2) all others. In addition, import/export statistical data for ballasts is not publicly available in Cambodia, Lao PDR, Myanmar, and Vietnam.

This informational barrier makes it difficult to estimate ballast trade figures for the ASEAN region. However, the available statistical data, domestic production, domestic consumption, import and export in each ASEAN member country are shown in Table 4. These figures are estimated based on Thailand’s figures for fluorescent ballast shares in total import and export figures, the survey questionnaires, data provided by representatives from ASEAN member countries<sup>4</sup>, statistical information from customs departments, the United Nations Statistic Division and expert interviews conducted in the region. Detailed import and export data is available in Appendix A.

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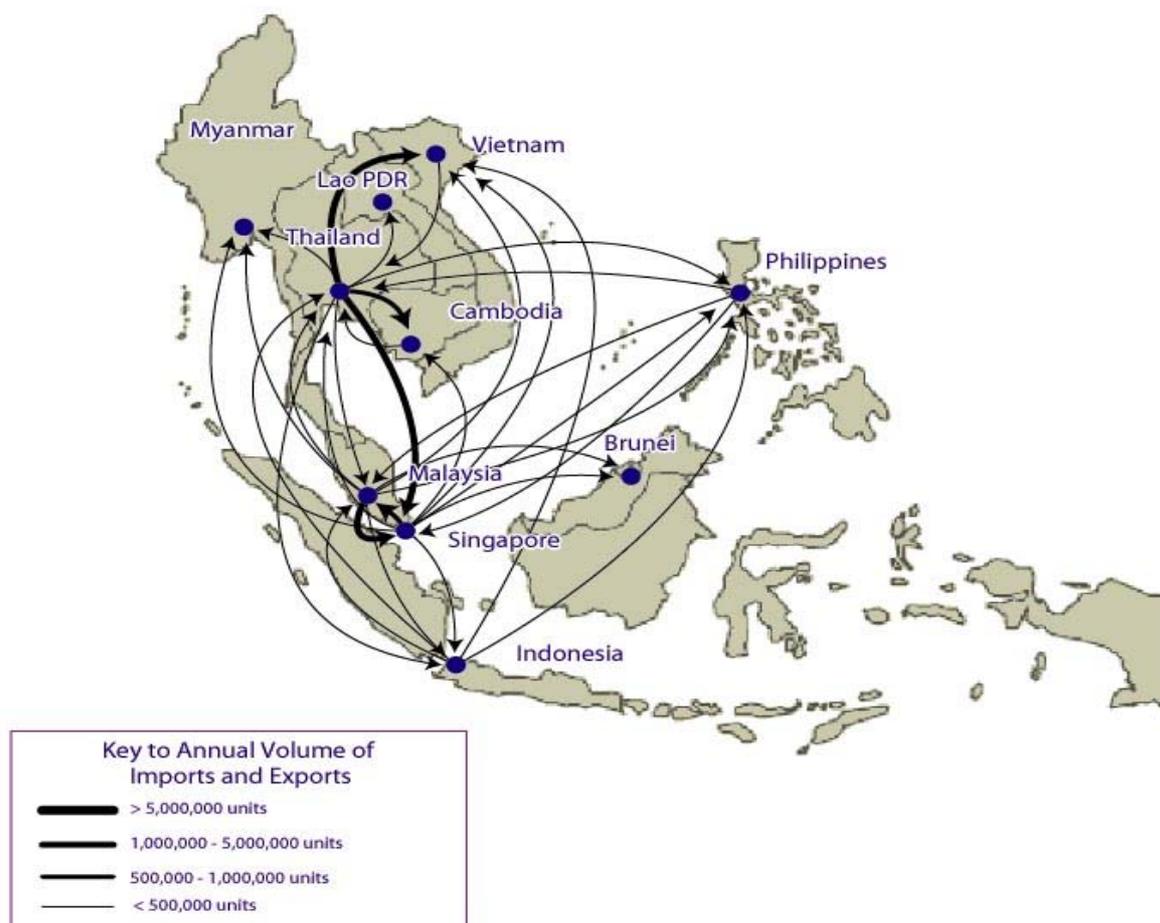
<sup>4</sup> Presentations by ASEAN representatives from the workshop, “Moving Forward the ASEAN S&L Program: Development of Harmonized Ballast Test Procedure”, 27-28 May 2004, Pattaya City, Thailand

**Table 4: Import/Export, Production and Consumption of Fluorescent Lamp Ballast in ASEAN**

ASEAN Member Countries	Fluorescent Ballast Import (unit)*	Fluorescent Ballast Export (unit)*	Domestic Production Capacity (unit)	Estimated Domestic Consumption (unit)
Brunei	86,270	-	-	86,270
Cambodia	762,398	-	-	762,398
Indonesia	1,161,725	1,951,282	50,000,000	49,210,443
Lao PDR	318,566	-	-	318,566
Malaysia	1,671,757	857,810	9,000,000	9,813,947
Myanmar	385,119	-	3,000,000	3,385,119
Philippines	831,883	411,638	10,000,000	10,420,245
Singapore	3,985,370	2,399,444	-	1,585,926
Thailand	1,723,749	7,501,355	25,000,000	19,222,395
Vietnam	1,252,143	-	5,000,000	6,252,143
<b>TOTAL</b>	<b>12,178,980</b>	<b>13,121,529</b>	<b>102,000,000</b>	<b>101,057,452</b>

\* Use % share of fluorescent lamp ballasts in total ballast import/export in Thailand for all other ASEAN member countries

Source: Survey questionnaires, import/export statistics and manufacturer interviews



**Figure 1: Ballasts Tradeflow within ASEAN Member Countries**

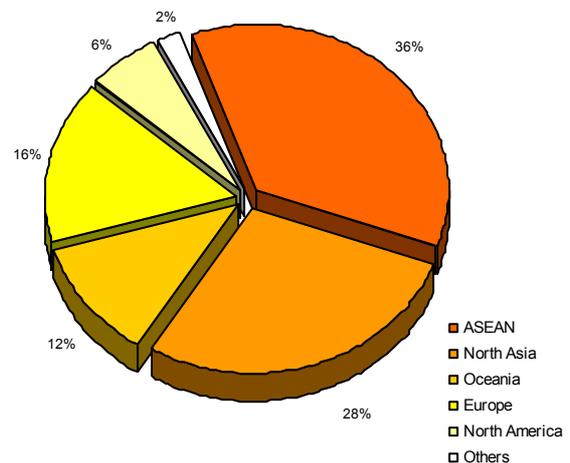
## Regional Production

It is difficult to determine the exact number of ballast manufacturers and their actual production capacity since there are a number of small non-registered manufacturers in the region. However, manufacturer surveys reveal that there are at least 80 fluorescent lamp ballast manufacturers spread among five member countries. According to expert opinion, there are about 20 manufacturers located in Indonesia. Based on data supplied by ASEAN representatives, 19 manufacturers are found in Malaysia, 9 manufacturers are located in the Philippines, 32 manufacturers are working in Thailand, and 4 manufacturers are presently found in Vietnam. The annual regional production capacity is estimated at 90 to 110 million units. Indonesia has the largest local manufacturing capacity, primarily serving domestic demand of 40 to 50 million units per annum. Standard electromagnetic ballasts have the largest production share, corresponding to domestic and regional demand.

## Regional Import

ASEAN member countries import approximately 20 million units of fluorescent lamp ballasts per annum (of which 36% is from manufacturers in the region while the rest comes from other regions) as illustrated in Figure 2.

Origin of Annual Ballast Import by the ASEAN region ('000 unit), 1999-2002	
ASEAN	7,797
North Asia	6,055
Oceania	2,534
Europe	3,392
North America	1,372
Others	328
<b>Total</b>	<b>21,478</b>



**Figure 2: Origin of Annual Ballast Import by ASEAN, 1999-2002**

Singapore is the largest ballast importer in the region followed by Thailand and Malaysia. Almost 50% of ballasts imported by Singapore are re-exported to other countries.

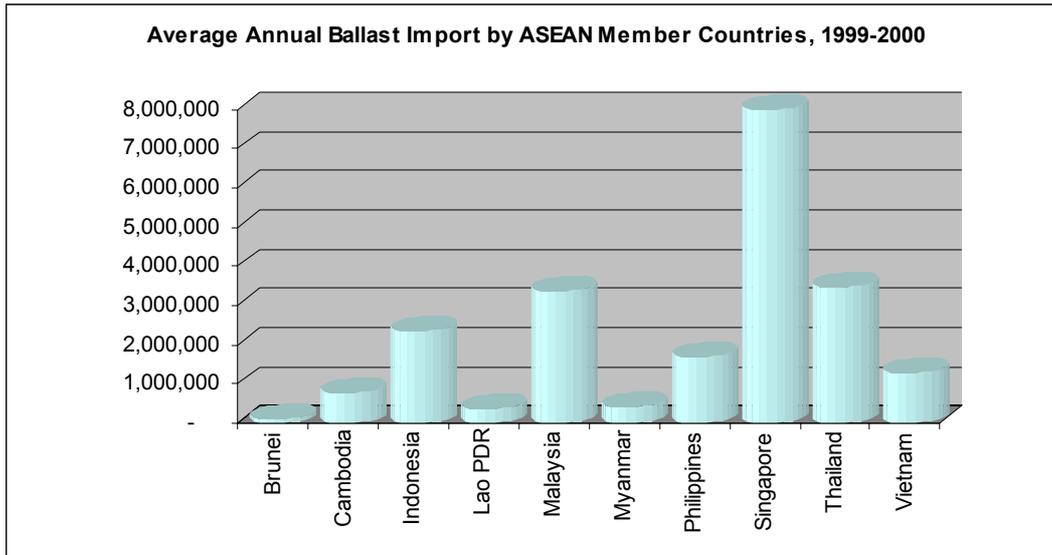


Figure 3: Average Annual Ballast Import by ASEAN Member Countries, 1999-2002

### Regional Export

Export of ballasts from all ASEAN member countries combined are approximately 18 million units per annum. The destinations of ASEAN annual export are shown in Figure 4. In this total, 50% is due to intra-regional trade (i.e., export and import by ASEAN member countries). Overall quantities of ballast exports from the ASEAN are illustrated in Figure 5 while destinations for those exports are graphically illustrated in Figure 6. Based on these statistics, it can be seen that Thailand exports 8-10 million units of fluorescent lamp ballasts per annum, nearly 90% of which is exported to its ASEAN neighbors. Indonesia's annual export is almost equivalent to Singapore's.

ASEAN	9,235
North Asia	5,154
South Asia	546
Middle East	475
Oceania	332
Europe	1,843
Africa	251
North America	223
Others	256
<b>Total</b>	<b>18,317</b>

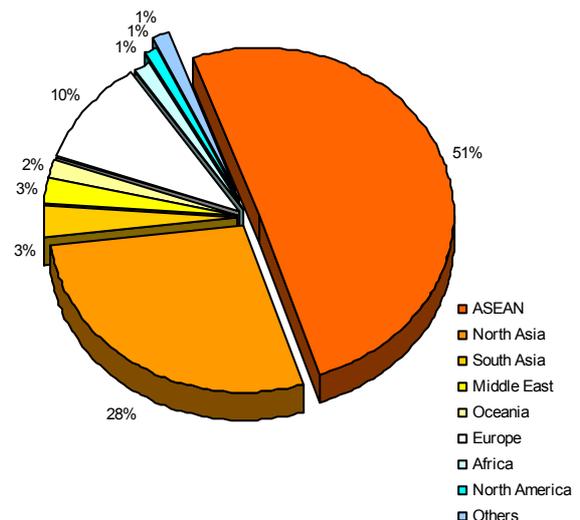


Figure 4: Destinations of Annual Ballast Export by ASEAN, 1999-2002

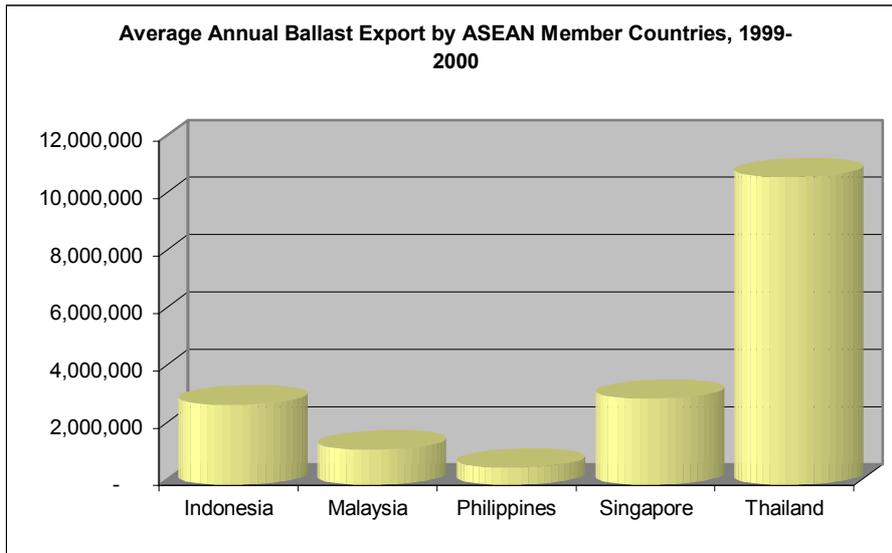


Figure 5: Average Annual Ballast Export by ASEAN Member Countries, 1999-2002

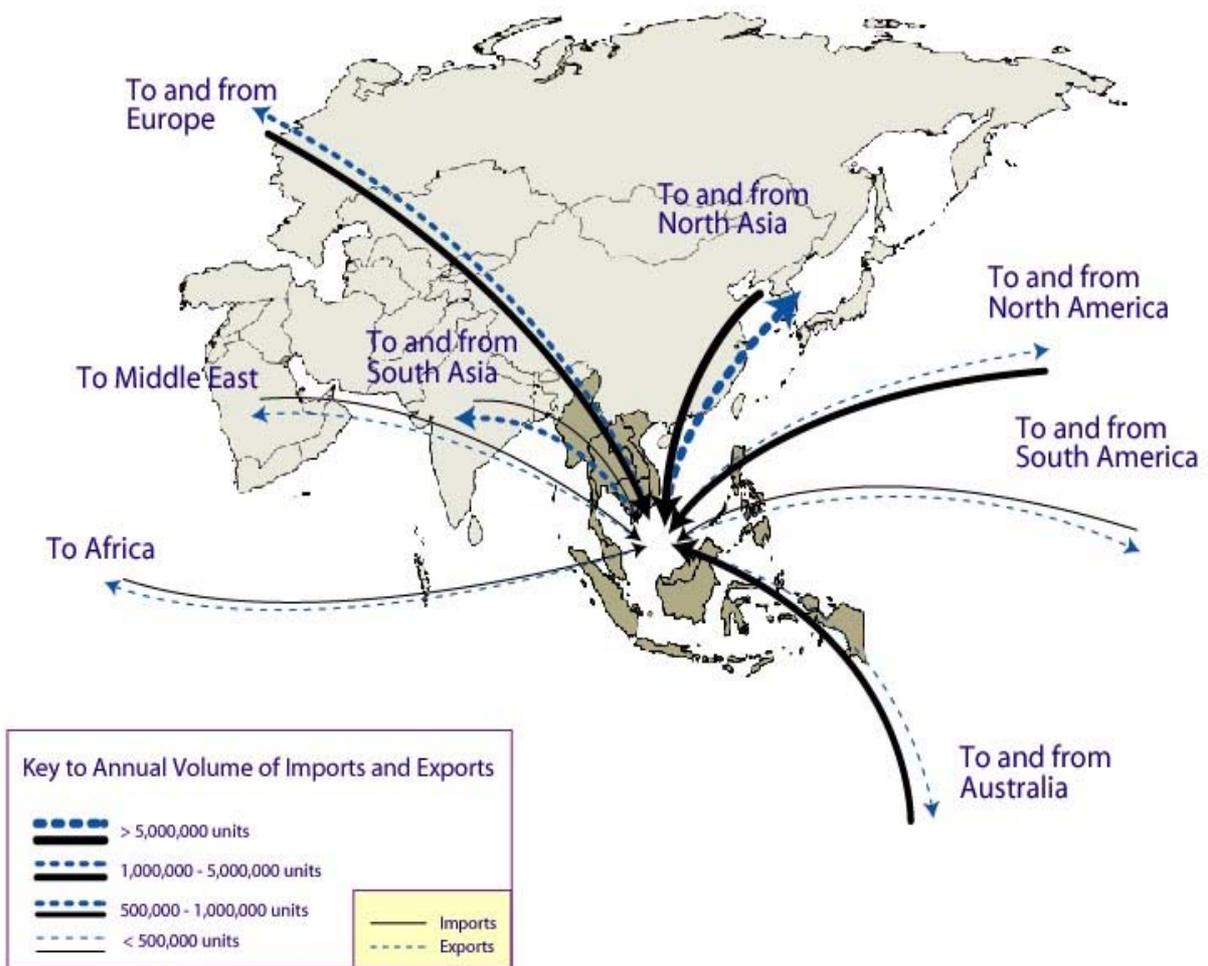


Figure 6: Destinations of ASEAN Ballasts Export and Import

## **1.5 Energy Performance and Safety Test Standards**

There is no internationally-recognized energy performance test standard for fluorescent lamp ballasts. Similarly, none of the ASEAN member countries have developed or implemented their own versions of such a standard. Most energy conservation programs promoting energy-efficient ballasts in ASEAN measure and calculate ballast energy performance based on parameters obtained from measurement according to the IEC 60921 and IEC 60929, performance requirement test standards for electromagnetic ballast and electronic ballasts, respectively.

However, there are efforts to develop better measurement methodologies to determine ballast efficiency. Examples may be found in CELMA (European Lighting Manufacturer's Association) and CENELEC (European Committee for Electrotechnical Standardization) who developed and adopted a standard (EN50294) to measure the efficacy of both fluorescent lamps and/or ballast combinations. This standard provides measurement methods for ballast energy consumption and performance when tested with a reference fluorescent lamp and reference ballast.

In the EN50294, the requirements for safety and performance of IEC60920, IEC60921, IEC60928 and IEC60929 are still referenced. The protocol in EN50294 is used as the test method to determine the ballast energy efficiency under CELMA's voluntary energy labeling program. Australia and New Zealand have jointly developed a method of measurement to determine energy consumption and performance of ballast-lamp circuits based on EN50294 and have published this as Australia/New Zealand Standard AS/NZ 4783.1:2001.

In addition to European and Australian/New Zealand standards, there are other ballast energy performance measurement standards being adopted and used by Canada, China, and the US. All these ballast performance measurements aim at measuring general electrical parameters of a lamp-ballast circuit (such as light output and total circuit power). The calculation of energy performance indicators derived from different methods (such as ballast lumen factor (BLF), ballast efficacy factor (BLC), and total input power) are what sets them apart.

Safety requirements for fluorescent lamp ballasts in ASEAN have been set and regulated in only six member countries: Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. These national safety requirements comply with the IEC 60920 (for electromagnetic ballasts) and the IEC 60928 (for electronic ballasts). For countries where national standards related to fluorescent lamp ballasts do not exist, they could be at risk for "technology dumping" of poor quality products due to the fact that all ballasts domestically produced and imported into the country are unlikely to be tested by properly accredited test laboratories. Table 5 illustrates the national performance and safety test standards presently used in many ASEAN member countries.

**Table 5: General and Safety Requirement Test Standards for Fluorescent Lamp Ballasts in ASEAN**

Country	National General and Safety Requirement Test Standard			
	Electromagnetic Ballast		Electronic Ballast	
	National Code	Reference	National Code	Reference
<b>Indonesia</b>	SNI 04-6509.1-2001	IEC 60920		
<b>Malaysia</b>	MS141: 1993 Part 1	IEC 60920	MS IEC 60928: 1995	IEC 60928
<b>Philippines</b>	PNS-12-1: 1996	IEC 60920	PNS 135-1: 1997	IEC 60928
<b>Singapore</b>	SS 490: Part 2: 8: 2001	IEC 60920	SS 490: Part 2: 3: 2002	IEC 60928
<b>Thailand</b>	TIS 23-2531	IEC 60082 (IEC 60920)	TIS 885-2532	IEC 60928
<b>Vietnam</b>	TCVN 6478:1999	IEC 60920		

Note: No national standard available for those ASEAN member countries that are not included in the table.  
Source: Survey questionnaires and National Standards Body in each ASEAN member country

**Table 6: Performance Requirement Test Standards for Fluorescent Lamp Ballast in ASEAN**

Country	National Performance Requirement Test Standard			
	Electromagnetic Ballast		Electronic Ballast	
	National Code	Reference	National Code	Reference
<b>Indonesia</b>	SNI 04-3561-1994	N/A		
	SNI 04-6510-2001	IEC 60921		
<b>Malaysia</b>	MS141: 1993 Part 2	IEC 60921	MS IEC 60929: 1995	IEC 60929
<b>Philippines</b>	PNS-12-2: 1996	IEC 60921	PNS 135-2: 1993	IEC 60929
<b>Singapore</b>	SS 491: 2001	IEC 60921	SS 380: Part 2: 1996	IEC 60929
<b>Thailand</b>	TIS 23-2531	IEC 60082 (IEC 60921)	TIS 1506-2541	IEC 60929
<b>Vietnam</b>	TCVN 6479:1999	IEC 60921		

Note: no national standard available for those ASEAN member countries that are not included in the table.  
Source: Survey questionnaires and National Standard Body in each ASEAN member country

## 1.6 Regional Testing Capability

There are at least six accredited government (or semi-government) testing facilities capable of conducting general performance and safety tests for fluorescent lamp ballasts in the region. These are the Electrical and Electronics Institute (EEI) and Metropolitan Electricity Authority (MEA) testing laboratory in Thailand, Sirim Qas Sdn Bhd in Malaysia, PSB Corporation in Singapore, PT. PLN (Persero) Jasa Teknik Kelistrikan in Indonesia, and Lighting & Appliance Testing Laboratory (LATL) in the Philippines. In addition, there are a number of unaccredited testing laboratories operated by lighting manufacturers to perform safety and performance test mainly for quality assurance of their own products.

Even though testing of fluorescent lamp ballasts in accredited testing laboratories is not their core service, all are familiar with testing procedures and testing equipment as specified in the relevant International Electrotechnical Commission (IEC) standards since all national test standards in ASEAN are referenced (or aligned with) IEC standards.

Consequently, ASEAN accredited test laboratories are capable of conducting energy performance tests without any additional major investments, if the newly developed ASEAN test procedure is basically referenced from the IEC standard.

### **1.7 Fluorescent Lamp Ballast Tariff Scheme**

Tubular fluorescent lamp ballasts are covered by the Common Effective Preferential Tariff Scheme (CEPT) for the ASEAN Free Trade Area (AFTA). CEPT is a cooperative arrangement among ASEAN member countries that will reduce intra-regional tariffs over a ten-year period starting in 1993.

The CEPT Scheme is the main instrument for making ASEAN a free trade area in 10 years. This means that ASEAN member countries shall have a common effective tariff among themselves in AFTA but the level of tariffs among non-ASEAN countries will continue to be determined individually. (Tariff rates of fluorescent lamp ballasts in AFTA have been reduced to 5% since 2000).

## **Chapter 2: Country Information**

### **2.1 Brunei Darussalam**

#### **2.1.1 Overview**

Brunei Darussalam is the smallest country in the region in terms of population, accounting for 0.4 million or roughly 0.07% of the ASEAN populace. Its GDP per capita is the second highest in the ASEAN, estimated to be US\$18,600 (in 2002). The national economy is mainly based on the crude oil and natural gas businesses which account for more than 50% of their GDP, 80 to 90% of all exports, and 75 to 90% of the government's revenues. To date, the industrial sector is small and undiversified.

In final energy consumption, petroleum has the largest share (65.6%) followed by electricity (31.3%) and gas (3.2%). Transportation remains the largest energy consumer, accounting for 47.8% of the total final energy consumed by the country.

The installed electricity generating capacity is 0.76 GW covering 100% of population throughout the country. Electricity is mainly generated by natural gas. Electricity consumption is approximately 2.3 billion kWh per annum. The residential and commercial sectors consume about the same portions (29.8% each) while the industrial sector consumes 14.4% of total electricity generated.

#### **2.1.2 Ballast Market**

##### **Market Overview**

Due to limited market size, there is no ballast manufacturing in Brunei Darussalam. All ballasts are imported from foreign countries, mainly from Malaysia and Singapore. The domestic fluorescent lamp ballast consumption is estimated to be only 0.1-0.2 million units per annum.

In Brunei Darussalam, 40W fluorescent lamps were phased out and replaced by 36W versions<sup>5</sup>. This is mainly because the major lamp manufacturers had stopped production of the 40-watt lamps. However, this situation is unlikely to affect the pattern of ballast usage in Brunei since normally ballasts for 40W tubular fluorescent lamps in the ASEAN region are designed to cope with the 36W lamp circuit. There is no information indicating which types of ballast have the largest marketshare but from ASEAN ballast expert interviews, it seems the low watt loss electromagnetic ballast has the largest marketshare, followed closely by electronic ballasts.

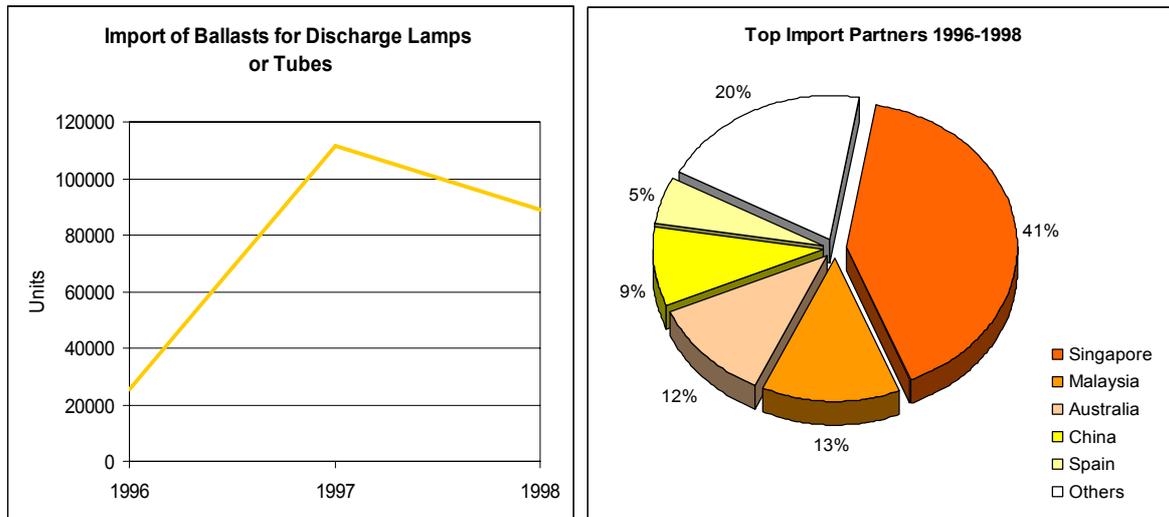
##### **Import and Export**

Based on statistical data obtained from the United Nations Statistics Division (UNSD) on ballasts for discharge lamps (or tubes which cover fluorescent lamps and other types of lamps) 55% of the ballasts imported by Brunei Darussalam during 1996-1998 are from its neighboring countries, Malaysia and Singapore. Australia and China are also major suppliers

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<sup>5</sup> Brunei Darussalam's National Standards and Labels for Refrigerators and Air Conditioners presented in Inception Workshop of the SOME-METI Project on PROMEEC - Buildings and PROMEEC - Industries Allson Hotel, Singapore, 25 - 26 November 2002

to Brunei, providing 12% and 9% shares, respectively. Presently, there is no ballast export from Brunei Darussalam. Figure 7 illustrates Brunei's top import partners.



Source: The United Nations Statistics Division (UNSD)

**Figure 7: Brunei Darussalam Import of Ballasts for Discharge Lamps or Tubes, 1996-1998**

### 2.1.3 Institutional Framework

#### Energy Policy and Regulatory Body

Energy policy and strategy functions are embodied in the Prime Minister's Office as the focal point for all government ministries and agencies. The Prime Minister's Office is responsible for setting, implementing, managing, and regulating all activities and plans that are considered national policies or strategies.

#### Electricity Utility

The Department of Electrical Services (DES), under the Ministry of Development, is an integrated monopoly electricity utility responsible for operating the electricity sector. DES' roles as a government department include formulation of standards and implementation of electricity usage. As the electricity provider, DES' roles include future generation and distribution planning.

There are three independent electricity supply networks in the country. Network 1 (operated by DES) supplies electricity to three districts, Brunei Muara, Tutong and Belait districts. Network 2 (operated by DES) supplies electricity to the Temburong district. Network 3 (operated by the Berakas Power Company Sdn. Bhd. or BPC) is an independent power utility which supplies electricity to selected users in the Brunei Muara district. The installed capacity of DES networks is 449 MW while the installed capacity of BPC networks is 259 MW.

#### Standards, Accreditation and Testing Body

The Construction Planning and Research Unit (CPRU) under the Ministry of Development is the national standard organization in Brunei Darussalam. CPRU also manages the Laboratory Accreditation Scheme in Brunei. Accreditation is based on the general criteria found in ISO/IEC Guide 25 - 1990 "General Requirements for the Competence of Calibration

Testing Laboratories". All applicants to the laboratory accreditation scheme must complete an application form which can be obtained at CPRU. At present, there is no fee payable for accreditation and the accreditation service is only provided for laboratories operating in Brunei Darussalam.

In addition to operating the electricity sector, DES is also responsible for conducting the energy consumption tests and endurance tests with results and certificates derived from local (or overseas) laboratories in accordance with the relevant test methodologies and standards.

#### **2.1.4 Standards and Labeling Program**

There was an attempt to implement an energy efficiency labeling program to promote energy efficiency and conservation, engage public awareness, and form an energy efficiency market in Brunei Darussalam. This effort was called the Energy Efficiency Labeling Scheme (EELS).

The Building Services Section (under the Department of Electrical Services or DES, under the Ministry of Development) was responsible for promoting and regulating the Energy Efficiency Labeling Scheme. For the first phase of the scheme, only air conditioners (split or single units operating with less than 10 kW cooling capacity) were considered. Energy efficiency was categorized into five levels with level 5 being most efficient. DES included fluorescent lamp ballasts in the scheme in 1999; however, an energy efficiency labeling scheme for fluorescent lamp ballasts has not yet been implemented.

## **2.2 Cambodia**

### **2.2.1 Overview**

Cambodia has a population of 13 million people, accounting for about 2.4 % of the total ASEAN populace. Its GDP per capita is the lowest in the region, estimated to be about US\$1,700. In 1999, the first full year of peace in 30 years, Cambodia's economic growth seemed to resume. Since then, Cambodia's GDP has grown 5% a year throughout the past five years. The garment sector is the most important production output while tourism is the fastest growing industry. Other manufacturing sectors and basic infrastructure have been developing after suffering decades of war and internal political problems. In addition, the lack of the population's education and productive skills remain barriers to the country's development.

Fuel wood and charcoal are major resources, accounting for more than 70% of the nation's energy consumption. Different from other ASEAN member countries, petroleum and electricity represent for a small portion of the total energy consumption.

It is estimated that the total installed electricity generation capacity is about 200 MW (of which 65% is consumed by the city of Phnom Penh). In the rural areas, less than 9% of the population is connected to the grid. Stand-alone diesel generators and car batteries (accounting for approximately 100 MW of power) are widely used as the main electricity source in businesses and villages in the rural areas, respectively. Nationwide, the overall electrification rate is about 15%.

Additionally, the price of electricity is as high as US\$0.14/kWh in Phnom Penh city, and US\$0.25 to US\$0.50/kWh in the rural areas. (Compared with electricity selling in Thailand at US\$0.05 to US\$0.06/kWh, the difference is enormous).

### **2.2.2 Ballast Market**

#### **Market Overview**

The development of the manufacturing sector is limited as a result of war and conflict. Imported products dominate a significant share of most market segments, including the fluorescent lamp ballast market.

Domestic fluorescent lamp ballast consumption is around 3 to 4 million units per annum. Standard electromagnetic ballasts are typically used for 18, 20, 36 and 40-watt tubular fluorescent lamps that account for 95% of the overall lamp usage on the market. The marketshare of low watt loss electromagnetic and electronic ballasts in the total ballast market for tubular fluorescent lamps is negligible.

According to the government's policy of providing adequate energy supply throughout the country at reasonable and affordable prices, lighting products (considered to be basic human needs once a household is electrified) have great potential to steadily expand as electrification throughout the country increases. However, energy efficient lighting products may not be able to grow in parallel with other basic, less expensive lighting products without government support. This support may take the forms of either public awareness campaigns or financial incentives for producers and purchasers.

## Import and Export

To-date, there is no information available regarding Cambodia's ballast imports and exports. From interviews with Thai ballast exporters on this topic, they estimate that approximately 80% of the ballasts domestically consumed in Cambodia are imported primarily from ASEAN member countries such as Thailand and Malaysia. The quality and reliability of these imported ballasts rely solely on these regional manufacturers.

## Distribution Channels

Lighting equipment is typically imported by wholesalers and sold to retailers. Wholesalers may sell directly in bulk to contractors or developers. Individuals and small-volume consumers normally purchase from hardware stores.

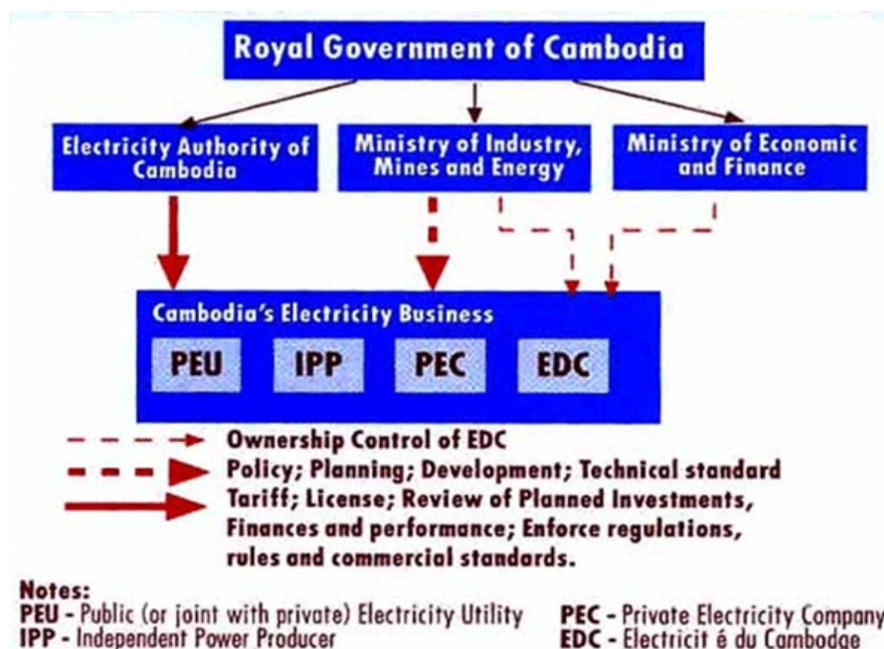
## 2.2.3 Institutional Framework

### Energy Policy and Regulatory Body

The Ministry of Industry, Mines, and Energy (MIME) is the focal point administering and controlling the energy sector. MIME is responsible for formulating and managing energy policies, electric power strategies, power development plans, as well as the technical, safety, and environmental standards.

### Electricity Utility

The Electricity Authority of Cambodia (EAC) is an autonomous body established to regulate and control the power sector, ensure the quality of supply, and provide better services to consumers. Electricite du Cambodge (EdC) is a government-owned power utility responsible for power generation, transmission, and distribution of power in authorized areas. The power industry structure is illustrated in Figure 8.



Source: Ministry of Industry Mines and Energy, Cambodia

Figure 8: Cambodian Power Sector Industry Structure

### **Standards, Accreditation and Testing Body**

The Department of Industrial Standards of Cambodia (ISC) under the Ministry of Industry, Mines and Energy, is responsible for developing national standards in Cambodia. However, national test standards, accreditation schemes, and local testing facilities for lighting equipment are not yet established. In addition, Cambodia does not yet have in place proper laws and regulations (or administrative procedures) to enforce compulsory standards. Therefore, the establishment of relevant institutional capacity to develop the legal and technical regulation is needed.

#### **2.2.4 Standards and Labeling Program**

At the present time, there have been no national S&L programs related to lighting equipment (including ballasts).

## 2.3 Indonesia

### 2.3.1 Overview

Indonesia is the largest country in the ASEAN region in both population and geographical area. In 2004, its population exceeded 238 million people, accounting for 40% of the ASEAN populace. The entire geographical area is comprised of five main islands (Java, Sumatra, Sulawesi, Kalimantan, and Irian Jaya) and 13,667 small islands, representing 40% of the ASEAN geographical area.

More than half of the national workforce is working in the areas of agriculture, forestry, and fishery (which account for 28-30% of the country's GDP). The most important industrial sectors are oil and natural gas processing, which represent 25% of the total value-added in industrial output. The export of oil and natural gas represents the largest share of the government's revenue.

Indonesia's installed capacity is 21.4 GW (87% generated by fossil fuels, 10.5% from hydropower generation). The industrial sector is the largest electricity consumer, accounting for 42.1%, followed by the residential sector at 39.4%, and the business sector at 13.5%.

### 2.3.2 Ballast Market

#### Market Overview

There is no official statistical data with respect to the fluorescent lamp ballast industry in Indonesia, therefore, information regarding the ballast market in Indonesia in this report is based on electric lamp production data supplied by the Indonesian Electrical Lighting Industry Association (APERLINDO).

**Table 7: Production Capacity of Electric Lamps in Indonesia in 2000**

No	Manufacturers name	Type of lamps production in million		
		Incandescent Lamps ( IL )	Fluorescent Lamps ( FL )	Compact Fluorescent Lamps ( CFL )
1	PT Sinar Angkasa Rungkut *	300	60	10
2	PT Philip Ralin electronics *	300	60	-
3	PT Osram Indonesia *	140	40	-
4	PT GE Lighting Indonesia *	75	25	-
5	PT Hikari *	50	20	-
6	PT Logam Matra/Eterna	20	5	-
7	PT Sinar Sanata Electroics	20	-	-
8	PT TFCMaspion Indinesia*	-	30	2
9	PT Matsushita Lighting Inds.*	-	7	5
10	PT Sarana Gatra Utama *	45	23	-
11	Other manufacturers	80	30	-
	<b>Total</b>	<b>1.030</b>	<b>300</b>	<b>17</b>

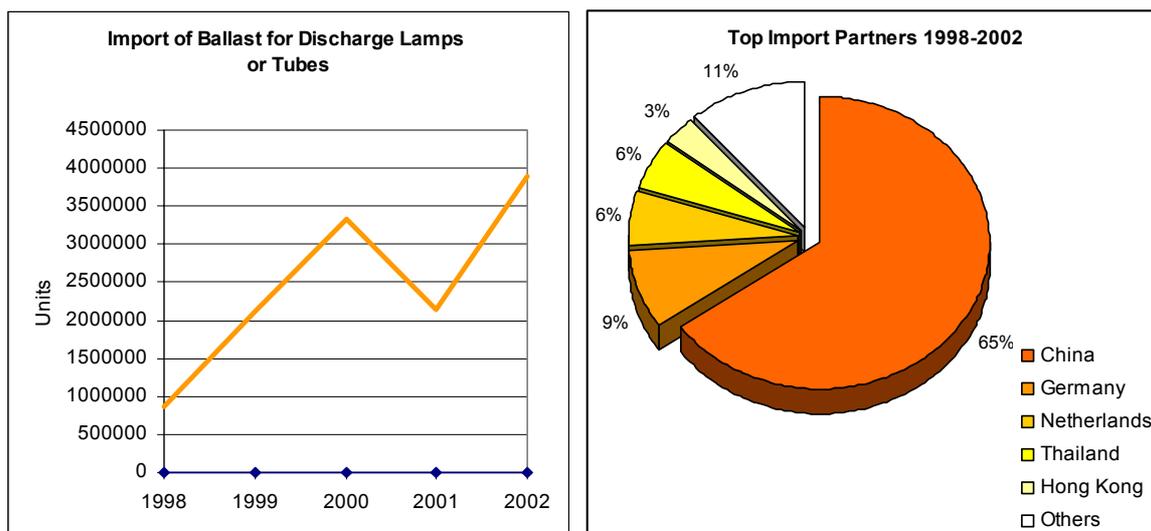
Source: Indocommercial, \*Association members.

There are 14 electric lamp producers in Indonesia, among which 8 are members of APERLINDO. Their combined production capacity is about 90% of the total domestic production capacity. The total production capacity of electric lamps in Indonesia in 2000 is shown in Table 7. Of the 300 million units of fluorescent lamps produced annually, approximately 50-60 million units are for export, leaving a domestic market size of about 240-250 million units per annum. Given the recent favorable economic growth and the acceleration of the rural electrification program, the production of electric lamps in Indonesia is in an upward trend. However, the majority of production is dominated by low efficiency incandescent lamps (nearly 77%).

Based on the assumption that 80% of the annual fluorescent lamp supply is for replacement, and that 20% is for new installation (as well as data supplied by government officials) Indonesia seems to have the largest fluorescent lamp ballast market in the region, accounting for 40-50 million units per annum. There are no official records of the domestic fluorescent lamp ballast manufacturers. However based on interviews, there are approximately 15 to 20 domestic manufacturers. The production capacity of these manufacturers is estimated to match domestic demand. Most ballasts domestically sold are of the standard electromagnetic ballast type for 18, 20, 36, 40-watt tubular fluorescent lamps. Low watt loss electromagnetic and electronic ballasts are not widely used in the country mainly due to higher purchasing cost. The residential sector is the largest fluorescent lamp ballast consumer, representing 47% of the marketshare, followed by 37% percent in the industrial sector, and 16% in the commercial sector<sup>6</sup>.

### Import and Export

Based on statistical data obtained from the United Nations Statistics Division (UNSD) on ballasts for discharge lamps (or tubes which cover fluorescent lamps and other types of lamps), 65% of ballasts imported by Indonesia during 1998-2002 were from China, followed by Germany (9%) and the Netherlands (6%). Among other ASEAN member countries, Thailand is the only country listed among the top five (6%) import partners. The average annual ballast imports by Indonesia in the same period were approximately 2.5 million units.



Source: The United Nations Statistics Division (UNSD)

**Figure 9: Indonesia's Import of Ballasts for Discharge Lamps or Tubes, 1998-2002**

<sup>6</sup> Based on consumption of tubular fluorescent lamps supplied by APERLINDO