

# Market Assessment of Green Goods, Services and Works in Bhutan

Contextualising and validating target sectors and creating the  
baseline for procurement-induced green consumption and  
production

September 2015

Green Public Procurement in Bhutan

## ABOUT GPP BHUTAN

The Green Public Procurement in Bhutan project (GPP Bhutan) is an EU-funded project under the EuropeAid SWITCH-Asia Programme. It aims to establish a strategic approach to scaling-up public demand for environmentally and socially preferable goods, services and infrastructure in Bhutan. The project seeks to promote value-for-money across the asset life cycle rather than simply at the point of purchase, in order to reduce the negative environmental impacts and maximize social benefits from procurement.

The project is implemented by a consortium of two international and three national organizations, namely the International Institute for Sustainable Development (Project Lead, Canada), the Bhutan Chamber of Commerce and Industry (Bhutan), the Royal Institute of Management (Bhutan), the Royal Society for Protection of Nature (Bhutan), and the Collaborating Centre on Sustainable Consumption and Production (Germany).

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### ABOUT THIS REPORT

This report is in accordance with the work plan for the EU-funded action **Activity 1.5** of the project *Green Public Procurement in Bhutan: A cross sectoral strategy for sustainable industrial competitiveness*. It is one part of a larger series of reports on public procurement in Bhutan, which can be accessed from the GPP Bhutan website: [www.gppbhutan.bt](http://www.gppbhutan.bt).

This report was primarily prepared by Ugyen Lham with assistance from Damcho Tshering. This report was edited by Pem Lama.

**Suggested citation:** GPP Bhutan (2015). *Market Assessment of Green Goods, Services and Works in Bhutan: Contextualising and validating target sectors and creating the baseline for procurement-induced green consumption and production*. Thimphu.

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## ACKNOWLEDGEMENTS

The Bhutan Chamber of Commerce and Industry, as the activity lead partner for this report, is thankful to the European Union for its generous support and the EuropeAid SWITCH-Asia Programme, in particular, for financing GPP Bhutan.

We would like to convey our thanks to the Department of Public Accounts, Ministry of Finance for providing us with the required data on government expenditure, to various officials from the Ministry of Works and Human Settlement, Ministry of Health and Ministry of Education for sharing information on green goods, services and works, and for sharing their experiences in relation to green public procurement, and to the respondents in our field survey and focus group discussions of suppliers and enterprises. Special thanks goes to Ms. Milissa Kelzang, Managing Director, Bhutan Concrete Brick, Bjemina for sharing materials and information about her company, and for providing full support while carrying out the Value Chain Analysis on local concrete bricks.

Finally, we extend our appreciation and thanks to the entire GPP Bhutan team in the International Institute for Sustainable Development (Bhutan and International offices), the Royal Society for Protection of Nature, the Royal Institute of Management and the Collaborating Centre on Sustainable Consumption and Production (Germany), for providing their expertise and valuable comments and feedback during the writing of this report.

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## Acronyms

10 <sup>th</sup> FYP	10 <sup>th</sup> Five Year Plan
11 <sup>th</sup> FYP	11 <sup>th</sup> Five Year Plan
3R	Reduce, Reuse and Recycle (Waste management concept)
AC	Alternating Current (electricity circuit)
ASEAN	Association of South East Asia Nations
ATM	Automated Teller Machine
AWP	Army Welfare Project
BAFRA	Bhutan Agriculture and Food Regulatory Authority
BBIPL	Bhutan Bitumen Industries Private Limited
BCB	Bhutan Concrete Bricks
BCCI	Bhutan Chamber of Commerce and Industry
BCD	Bhutan Centennial Distillery
BHUBIT	Bhutan Bitumen
BHUBIT-RS	Bhutan Bitumen - Rapid Setting Emulsion
BIS	Bureau of Indian Standards
BNBL	Bhutan National Bank Limited
BOQ	Bill of Quantities
BSB	Bhutan Standard Bureau
BSR	Bhutan Schedule of Rates
BWR	Boiling Water Resistant (wooden/plywood quality).
CBE	Cationic Bitumen Emulsion
CCNA	CISCO Certified Network Associate
CGI	Corrugated Galvanized Iron (sheet)
CO <sub>2</sub>	Carbon dioxide
COP15	15 <sup>th</sup> Conference of Parties
CSMEs	Cottage, Small & Medium Enterprises
CSMI	Cottage, Small & Medium Industry
DPA	Department of Public Accounts
DRA	Drug Regulatory Authority
DRC	Department of Revenue and Customs
EC	European Commission
EDP	Economic Development Policy (2010)
EU	European Union
FDI	Foreign Direct Investment
FGD	Focus Group Discussions
GDP	Gross Domestic Product
GEP	Guaranteed Employment Programme
GHG	Greenhouse Gas
GNH	Gross National Happiness
GPP	Green Public Procurement
HR	Human Resources
ICEB	Interlocking Cement Earth Block
ICT	Information and Communication Technology



ILO	International Labour Organization
INR	Indian Rupee
IP	Internet Protocol
ISO	International Standards Organization
ISWM	Integrated Solid Waste Management
IT	Information Technology
LCA	Life Cycle Assessment
LECRDS	Low Emission, Climate Resilient Development Strategy
LED	Light Emitting Diode
MCSE	Microsoft Certified Professional Systems Engineers
MOAF	Ministry of Agriculture and Forests
MOE	Ministry of Education
MOEA	Ministry of Economic Affairs
MOF	Ministry of Finance
MOFA	Ministry of Foreign Affairs
MOH	Ministry of Health
MOHCA	Ministry of Home and Cultural Affairs
MOLHR	Ministry of Labour and Human Resources
MOWHS	Ministry of Works and Human Settlement
MR	Moisture Resistant (wooden, mainly plywood quality)
NEC	National Environment Commission
NRDCL	Natural Resources Development Corporation Limited
Nu.	Bhutanese <i>Ngultrum</i> (BTN)
OEM	Original Equipment Manufacturer
OHS	Occupation Health and Safety
PABX	Private Automatic Branch Exchange
PET	Polyethylene Terephthalate
PLC	Programmable Logic Controller (computer programme)
PRR	Procurement Rules & Regulation (2009)
RBA	Royal Bhutan Army
RGOB	Royal Government of Bhutan
R-Value	Heat Resistance Value
SBD	Standard Bidding Document
SCP	Sustainable Consumption and Production
SOEs	State Owned Enterprises
TCC	Thimphu City Corporation
TMT	Thermo Mechanically Treated (construction rebars)
TI	Technical Training Institute
UNFCCC	United Nations Framework Convention on Climate Change
UPS	Uninterruptible Power Supply
US/USA	United States of America
VCA	Value Chain Analysis
VOC	Volatile Organic Compound
VSK	Vertical Shaft Kiln (Cement Klinker type)
YDF	Bhutan Youth Development Fund

# Executive Summary

This report is an outcome of the market assessment undertaken on green goods, services, and works in Bhutan for the EU-funded Green Public Procurement in Bhutan Project (GPP Bhutan). The report provides both demand and supply side perspectives. The demand side looks at public spending on goods, services and works by the Royal Government of Bhutan (RGOB) and the extent to which there is demand for green goods, services and works. The supply side looks at the availability and capacity of Bhutanese suppliers to provide green goods, services and works.

## Main findings

### *Demand side of public procurement*

The green economy paradigm is increasingly gaining global momentum as it plays a crucial role in sustaining our resources. In Bhutan, the concept of the green economy is well suited to the country's development philosophy of Gross National Happiness (GNH), which also seeks to integrate equitable and sustainable socioeconomic development with good governance, environmental conservation, and social and cultural cohesion. The Economic Development Policy (EDP) 2010 was formulated with a vision "to promote a green and self-reliant economy." The 11<sup>th</sup> Five Year Plan (11<sup>th</sup> FYP) gives special attention to "self reliance and inclusive green socioeconomic development." It lays importance on the three strategic thrust areas, namely, i) inclusive social development, ii) accelerated green economic development, and iii) strategic infrastructure development. Policy initiatives and programmatic actions are also being undertaken to combat challenges posed by climate change.

The RGOB, as in many other countries, is the biggest procurer in the country. The 10<sup>th</sup> Five Year Plan (10<sup>th</sup> FYP) budget outlay was Nu. 150.9 billion, out of which Nu. 90.8 billion (61 per cent of the total plan budget) was spent on public procurement of goods, works, and services. The two areas of highest and frequent public spending were infrastructure/works such as roads and buildings, and professional services. Works, therefore, accounted for the highest expenditure amounting to Nu. 42.4 billion (47 per cent) with the Ministry of Works and Human Settlement (MOWHS) accounting for the highest expenditure amongst public agencies with Nu. 17 billion (19 per cent of total procurement expenditure, and 36 per cent of total procurement expenditure of the 10 ministries). In addition to the 10 ministries, government expenditure includes spending by autonomous agencies, *dzongkhags* and state-owned enterprises (SOEs).

While there are many ways to drive a green economy, public procurement is one essential avenue. In view of the government a large share of public money towards purchasing goods, services and infrastructure, it is important to assess and understand the sustainability of the resources, procurement procedures, and the ultimate benefit and the life cycle of the products (goods, works and services).

In order to understand the potential of GPP in Bhutan, it is crucial to understand the current market scenario including the availability of products in the market and the willingness of the procurers to procure locally available green goods, works and services.

This study methodology included a combination of desk research and field visits. To supplement the supply side study, Value Chain Analysis (VCA) was conducted for two locally produced goods, namely Bhutan Concrete Bricks (BCB) and Double Glazed Windows. The research study, nevertheless, had its limitations. The study did not geographically cover the whole country. The field survey area included only the major areas of economic activity in Thimphu, Phuentsholing and Gelephu districts.

While there is keen interest and willingness from government procuring agencies to promote sustainable consumption and production (SCP) of green goods, works and services, there are also reservations regarding the capacity and reliability of suppliers. The interest of the government to initiate GPP is elevated by the persistent balance of trade deficits, coupled with the global initiatives on SCP and combating the challenge of climate change. Certain green products are locally available, particularly construction materials such as concrete bricks, hollow blocks and wood products. A green product that is not locally available could be imported and supplied to procurers.

### *Supply side of public procurement*

On the supply side, more than 30 Bhutanese enterprises were surveyed and a Focus Group Discussion (FGD) held to substantiate the survey information. It is generally assumed that local products are comparatively more expensive and of inferior quality than imported products. The assumptions are mainly based on the higher labour charges in the country and the historically low capacity of local enterprises to produce and supply products with consistent quantity and quality.

Our supply side study indicated that the assumptions do not reflect the market reality. Should the challenges of the local suppliers be reviewed and addressed rationally, the suppliers claim that the market scenario is different from the past. While there is enough space in the policy and legal frameworks to practice GPP, a closer attention is required in the implementation practices. For example, when the Bill of Quantities (BOQ), which provides all the technical specifications of a work (quantity, materials and the quality), in the tender document, mentions a requirement to use “red bricks”, the works supplier/contractor has no choice but to adhere to it. The BOQ refers to red bricks as it is listed in the Bhutan Schedule of Rates (BSR). To the contractors/suppliers, winning the contract and avoiding audit observation upon completion of the work is a priority. Therefore, for suppliers, proposing alternative materials, even if it is available in the local market takes a secondary option. If the tender documents/BOQ provide options to the contractors, contractors could then offer green and locally available materials as an alternative.

An FGD with eight suppliers confirmed that although there are locally produced construction materials, it is the tendency of the procurers with misconceptions to opt for imported materials due to limited communication and coordination between procurers and suppliers. The local suppliers indicated that procurers (public and private), due to lack of VCA or life-cycle assessment (LCA) knowledge and information, which highlights environmental and social benefits, also could be a reason for not valuing green products.

There is a general expectation amongst the suppliers consulted during the field survey, particularly local manufacturing enterprises, that if suppliers are to “go green” there will need to be an incentive to do so – such as a preferential procurement programme. The suppliers expressed that although there is interest and willingness in the government procurers to promote green goods, works and services, the lack of clarity in communication forms a bottleneck. Both the EDP and the 11<sup>th</sup> FYP contain aspects of promoting self-reliance and green procurement practices, as does the Procurement Rules and Regulation (PRR 2009).

### *Analysis of the findings*

The gap between the demand and supply is due mainly to a lack of coordination and limited channels of communication. The procurers do not seem to conduct market surveys and acquire updated information on the local markets on availability of goods, works and services. They continue to carry the perception of lack of capacity with local producers/suppliers to meet the demand of green goods, works and services. Suppliers, on the other hand, failed to enhance the visibility of their replenished ability to supply green goods, works and services. With preferential treatment and other incentives, if considered by the government, suppliers would be encouraged to compete with imported products. Enhancing communication mechanisms to enhance awareness on both sides of the procurement ecosystem is seen as an urgent and vital action. Should there be clear communication channels, strategic plans and appropriate incentives to the suppliers to promote GPP, both procurers and suppliers express a keenness to adopt green procurement practices.

Concerted efforts to promote green procurement through improved coordination and communication mechanisms are, therefore, suggested as a foreseeable way forward.

# Section 1: Introduction

## 1.1 Background

The green economy paradigm is increasingly gaining global momentum as it plays a crucial role in sustaining our resources. In Bhutan, the concept of the green economy fits well within the development philosophy of Gross National Happiness (GNH), which seeks to integrate equitable and sustainable socioeconomic development with environmental conservation, social and cultural cohesion, and good governance. It is therefore recognized that Bhutan has taken important steps towards promoting a green economy.

The 11<sup>th</sup> Five Year Plan (11<sup>th</sup> FYP) gives special attention towards “Self-reliance and inclusive green socio-economic development.” The 11<sup>th</sup> FYP also emphasizes the importance of three strategic thrust areas, namely: i) inclusive social development, ii) accelerated green economic development and iii) strategic infrastructure development. The plan mainstreams the United Nations concept of Low Emission, Climate Resilient Development Strategy (LECRDS).

Globally, it is accepted that an emerging threat to socioeconomic development and the environment is the irreversible impacts of climate change. As a country with a vulnerable mountain ecosystem, Bhutan has always shown serious concern about the impact of climate change. In hope of setting an example to the global community towards a green economic development path and to cut Greenhouse Gas (GHG) emissions, Bhutan made a commitment “to maintain Bhutan’s status as a Net Sink for GHGs by ensuring that GHG emission levels do not exceed the sequestration capacity of its forests” (NEC, 2012) at the 15<sup>th</sup> Conference of Parties (COP15) of the United Nations Framework Convention on Climate Change (UNFCCC) in 2009. The global approach to low emissions economic activities through innovative and energy efficiency technologies will overtly change the market for goods, works and services. The European Union (EU) countries, Association of South East Asia Nations (ASEAN) as well as India and Sri Lanka in South Asia are already on the track of researching and adopting energy efficiency technologies and green public procurement, further encouraged by the EU SWITCH-Asia Programme. For its part, the RGOB formulated the EDP 2010 with a vision “to promote a green and self reliant economy sustained by an IT enabled knowledge society guided by the philosophy of Gross National Happiness.” Successive national reports such as “Bhutan: In Pursuit of Sustainable Development (2012)” and “Happiness: Toward a New Development Paradigm (2014)” further underscore Bhutan’s strategic commitment to green economy initiatives.

The RGOB, like in many countries, is the main public procurer spending substantial amount of developmental plan budgets in procurement of goods, works and services. While there are many ways to drive a green economy, public procurement is one essential avenue. While the policy and legal frameworks of the government contains space to accommodate green procurement practices, it is crucial to assess the market scenario including the availability of green goods, works and services in the market, the willingness of procurers to purchase locally available products and the capacity of suppliers to meet demand.

The following two subsections of the report provide an overview of government procurement in the 10<sup>th</sup> FYP, spanning the period 2008 to 2013, and the prevailing supply market scenario in Bhutan. Section 2 outlines the key concepts of Green Public Procurement (GPP) and related terminologies used in this report. Section 3 describes the research methodology and approach, including limitations. Section 4 presents findings

from the literature review and the field surveys. Section 5 describes the analysis and findings, and Section 6 presents supplementary findings on the Value Chain Analysis (VCA) carried out for two selected local products: concrete bricks and double glazed glass windows. Finally, section 7 provides the conclusions of the report along with a summary of suggestions.

## 1.2 Demand side of Public Procurement

The RGOB's public procurement includes expenditures incurred by the ten ministries, autonomous agencies, dzongkhags (districts) and State-Owned Enterprises (SOEs). The total budget outlay of the 10<sup>th</sup> FYP was Nu. 150.9 billion. Public procurement of goods, works, and services by the government in the 10<sup>th</sup> FYP amounted to Nu. 90.8 billion, translating to 61 per cent of the total plan budget and 21 per cent of the total GDP for the same period.

The top three highest and frequent public spend was incurred on structures such as roads, buildings, and professional services, respectively. Works accounted for the highest share of total public procurement with Nu. 42.4 billion (47 per cent), followed by services (consultancy, catering, etc.) with Nu. 22.2 billion (24 per cent) and goods with Nu. 16.6 billion (18 per cent). The Ministry of Works and Human Settlement (MOWHS) accounted for the highest expenditure among the ten ministries with Nu. 17 billion (36 per cent). The Department of Public Accounts (DPA) categorizes activities such as maintenance of properties, survey/census, hospitality & entertainment, etc., as goods/services. This category of procurement accounted for an expenditure of Nu. 9.6 billion (11 per cent).

Given the huge government spending on public procurement, it is important to assess the sustainability of resources, procurement procedures, end benefit and the life cycle of the products and services. In the sustainability assessment, it is crucial to understand the market scenario including the availability of the products and services, and the willingness of the procurers to source locally available products and services.

## 1.3 Supply side of Public Procurement

Supply refers to the goods, works and services supplied by Bhutanese enterprises. Supply of green goods, works and services means the supply of green products that meet the criteria listed in the key concepts detailed in section 2 of this report. A green good can be locally sourced or imported. For example, corrugated galvanized iron (CGI) sheets that reduce the cutting of trees for shingle roofing qualify as a green good, but are not produced in the country. Some imported goods are improved with local value addition and finishing. Imported glass can be framed with double glazing methods to conserve energy in buildings. Locally produced goods include bricks and hollow blocks which compete against imported mud/clay bricks, and locally manufactured furniture compete against imported furniture. Mud/clay bricks production essentially involves emission of GHGs during firing and cooling sub-stages as well as ash and soil waste production, unlike concrete bricks and hollow blocks production. Local products have the additional advantage of reducing emissions from transportation.

## Section 2: Key Concepts Pertaining to Green Goods, Works and Services

The key concepts outlined below provide the guiding principle in conducting the market assessment of green goods, works and services for the purposes of this report:

- a. Key concepts considered in market assessment of green goods, works and services include:
  - Supports conservation of resources such as land, water, forest, and energy
  - Has minimal air pollution including GHG emissions
  - Use of resources is sustainable
  - Resources are organic
  - Resources are renewable
  - Resources have recycled contents
  - Resources and wastes are non-toxic/non-hazardous
  - Wastes generated are re-usable, recyclable, and biodegradable
  - Products are energy efficient in production, use and disposal
  - Products are wholly or in part produced by the domestic enterprises
  - Products have long life and durable benefits
  - Products are cost effective
  - The activity generates employment and income to Bhutanese citizens
  - Products adhere to ILO labor conditions and related health and safety regulations (including not using child and forced labor)
  - Products meet ISO standards
- b. Besides the above key concepts, frequently and specifically used terms/phrases like, goods, works and services, etc. are defined towards the end of the report for clearer understandings and references.



## Section 3: Methodology and Limitations

### 3.1 Methodology

The methodology adopted for the study is a combination of desk research and field verification.

- a. Primary research/field verification:  
The information collection on the demand side consisted of consultations with relevant government agencies (ministries, autonomous agencies and *dzongkhags*) and SOEs. The consultations consisted of both individual interviews and focus group discussions (FGDs).
- b. Secondary research/desk research:  
Under the desk research, review of both national and international reference materials (both offline and online), were conducted.

This procedure helped to narrow down the focus of the study to big public procurement spend items. Narrowing the focus of study on demand side helped to narrow down the supply side focus, and it was particularly beneficial, given limited time and resources to complete the assessment.

On the supply side, following methods were applied to collect data from local enterprises:

- One-on-one meetings with suppliers/manufacturers
- Focus Group Discussions (FGDs), and
- Field surveys

To supplement supply study information, a Value Chain Analysis was carried out by the research team for two locally produced goods: concrete bricks and double glazed glass windows.

### 3.2 Research limitations

The limitations of this research include:

- i) Demand side research was limited to review of procurement by the government ministries, autonomous agencies, *dzongkhags* and SOEs in the 10<sup>th</sup> FYP. And, only the procurement expenditure from the capital budget was reviewed.
- ii) Under the capital budget expenditures, items that did not relate directly to public procurement, for instance, capital grants, acquisition of equities/shares, were not compiled, when 46 per cent of procurement is funded through external grants.
- iii) Supply side research was limited to field surveys carried out in three places, viz. Gelephu, Phuentsholing and Thimphu. Further, the FGD was limited to suppliers in Thimphu, which did not have representation of the furniture suppliers.
- iv) A value chain analysis was carried out for two different local products (concrete bricks and double glazed glass windows), focusing exclusively on the production and assembling phase. VCA could have covered the whole life-cycle of the products (from extraction of raw materials for the product to treatment at the end-of the life of the products).



## Section 4: Research Findings

### 4.1 Demand side of public procurement

The public procurement demand side study aimed at finding out the procurement figures by procurement categories and frequency of public spending from the 10 ministries, autonomous agencies, dzongkhags and SOEs during the 10<sup>th</sup> FYP (2008-2013). The study carried out surveys and consultations covering the 10 government ministries and some autonomous agencies to validate if the procurement procedures were implemented uniformly across all government agencies. The demand side information gathered through this study was further substantiated by other peer reports of GPP Bhutan, viz., Activity 1.1 report on Quantitative Mapping of Public Procurement in Bhutan, and Activity 1.2 report on Legal Analysis of Public Procurement Framework in Bhutan.

#### 4.1.1 Procurement budget distribution in 10<sup>th</sup> FYP

**Table 1: 10<sup>th</sup> FYP budget distribution in procurement**

Fiscal Years/ Financial Years	RGoB Budget	Government Procurement Exp.	Exp. of Govt. Procurement to National Budget	Expenditure SOEs	Exp. of SOEs to National Budget	Real GDP	Exp. of Govt. to GDP	Exp. of SOEs to GDP
2008-2009	21,585	8,934	41%	2,095	10%	61,221	15%	3%
2009-2010	26,304	13,298	51%	2,512	10%	72,497	18%	3%
2010-2011	31,587	15,878	50%	2,733	9%	84,950	19%	3%
2011-2012	37,923	19,178	51%	3,179	8%	97,453	20%	3%
2012-2013	33,486	18,963	57%	4,026	12%	104,378	18%	4%
<b>Total</b>	<b>150,885</b>	<b>76,251</b>	<b>51%</b>	<b>14,545</b>	<b>10%</b>		<b>18%</b>	<b>3%</b>

**Source:** Activity 1.1 report, Quantitative mapping of public procurement

The total budget outlay of the 10<sup>th</sup> FYP was Nu. 150.9 billion. Around Nu. 76.3 billion (51 per cent) of the national budget was spent on public procurement of goods, works and services by the government encompassing 10 ministries, autonomous agencies, and the dzongkhag. The SOEs spent around Nu. 14.5 billion (10 per cent) of the national budget on public procurement in the 10<sup>th</sup> FYP. The government procurement expenditure therefore accounted for around 61 per cent of the total 10<sup>th</sup> FYP budget. The average procurement expenditure by the government and SOEs were 18 per cent and 3 per cent of the real GDP, respectively, thus accounting for 21 per cent of the GDP over the period of the 10<sup>th</sup> FYP.

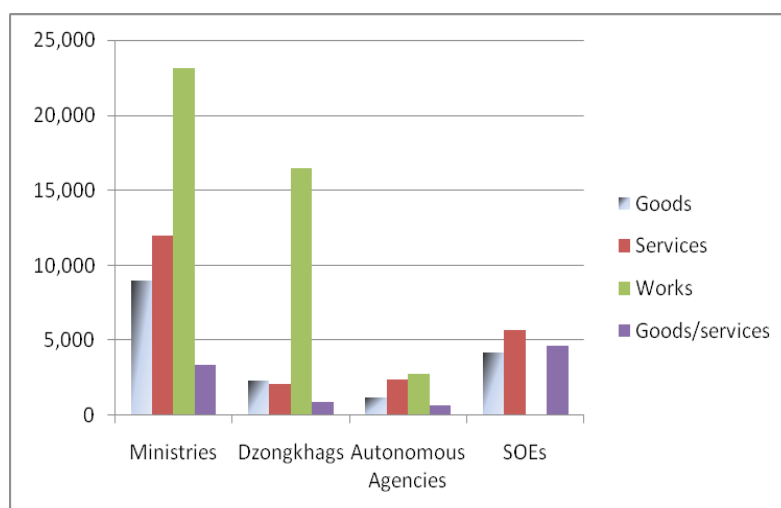
## 4.1.2 Procurement expenditure distribution by procurement categories and agencies

**Table 2: Distribution of capital expenditure by procurement categories and agencies**

Expenditure in Million Ngultrum 2008-2013						
Procurement Category	Ministries	Dzongkhags	Autonomous Agencies	SOEs	Total	% of total by Procurement Category
Goods	8,954	2,325	1,188	4,174	16,641	18%
Services	12,003	2,098	2,403	5,678	22,182	24%
Works	23,094	16,474	2,774	59	42,401	47%
Goods/Services	3,380	888	669	4,632	9,569	11%
Total	47,431	21,785	7,034	14,543	90,793	100%
% of total by Government Agencies/ SOEs	52%	24%	8%	16%	100%	

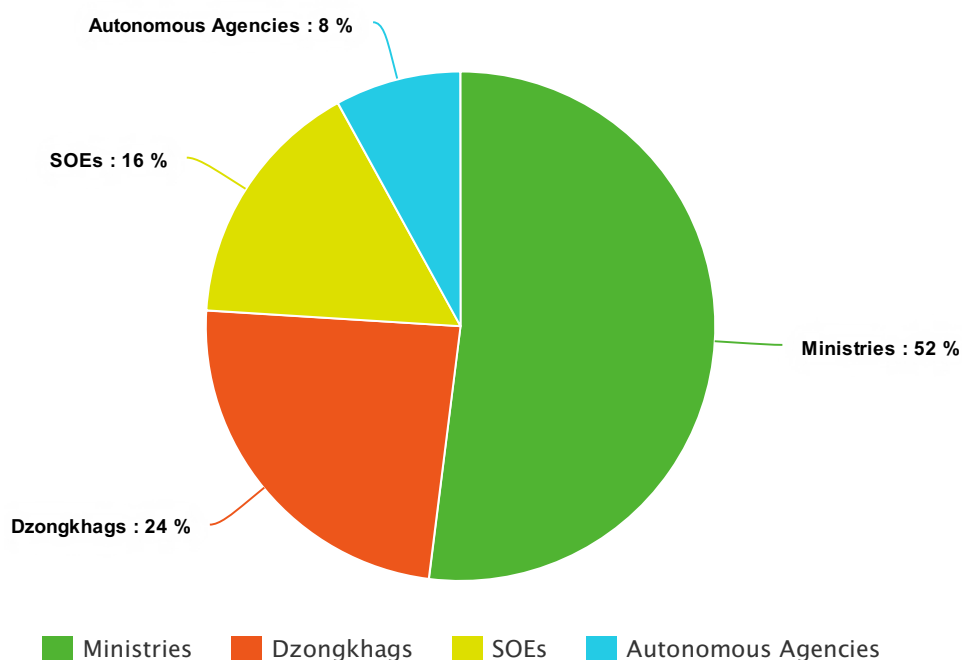
**Source:** Activity 1.1 report, Quantitative mapping of public procurement

Frequent public spending on procurement was incurred on structures such as roads, buildings, and professional services respectively. Therefore, the procurement of works accounted for the highest expenditure of Nu. 42.4 billion (47 per cent), followed by procurement of services of Nu. 22.2 billion (24 per cent) and goods with Nu. 16.6 billion (18 per cent). As evident from Figure 1, works visibly dominated the procurement in the 10 ministries and the dzongkhags. In SOEs, the works expenditure is very low. Services were more prominent in ministries and the SOEs. Activities considered as combination of goods and services (maintenance of properties, survey/census, hospitality & entertainment, etc.) incurred an expenditure of Nu. 9.6 billion (11 per cent).



**Figure 1: Procurement distribution by category and agencies**

In the procurement by public authorities, the 10 ministries together spent the highest amount with Nu. 47.4 billion (52 per cent) followed by dzongkhags with Nu. 21.8 billion (24 per cent), SOEs with Nu. 14.5 billion (16 per cent) and autonomous agencies with Nu. 7 billion (8 per cent).



**Figure 2: Procurement expenditure distribution by agencies**

#### 4.1.3 Distribution of capital expenditure among the 10 ministries (10th FYP)

Due to frequent spending on structures like roads and buildings, Table 3 shows that the Ministry of Works and Human Settlement (MOWHS) spent the highest in procurement amongst the ten ministries, followed by the Ministry of Agriculture and Forests (MOAF) and then the Ministry of Education (MOE). The Ministry of Foreign Affairs (MOFA) made the lowest procurement spend.

**Table 3: Percentage of capital expenditure in percentage among the 10 ministries**

Descriptive Statistics (Exp. in Million Nu.)					
	Minimum	Maximum	Sum	Mean	Std. Deviation
MOHCA	66	444	4,297	215	127
MOF	29	221	2,207	110	56
MOFA	1	166	1,093	55	52
MOAF	103	694	5,605	280	126
MOWHS	18	4,137	17,001	850	1,369
MOEA	15	1,541	3,263	163	347
MOIC	6	953	4,196	210	295
MOH	40	609	4,539	227	169
MOE	10	709	4,062	203	204
MOLHR	13	151	1,168	58	48
<b>Total</b>			47,431		

**Source:** Activity 1.1 report, Quantitative mapping of public procurement

The 10 ministries together spent a total of Nu. 47.4 billion, which is 52 per cent of the total procurement expenditure. MOWHS alone spent Nu. 17 billion, accounting for 19 per cent of the total government procurement expenditure, which is 36 per cent of the procurement spending of the ten ministries.

#### 4.1.4 Demand for green goods, works and services

There is a keen interest in the government agencies to promote the production and consumption of green goods, works and services as they directly support economic, environmental, and social sustainability principles, which form the cornerstones of the GNH philosophy. Many interviewees in the government agencies highlighted that due to the recurring negative balance of trade and Indian Rupee (INR) shortage situation that the country was facing, the need to implement green public procurement that encouraged consumption of local products and services was felt important and timely.

Interviewees, however, expressed that green public procurement is not actively pursued at the moment for varying reasons. Some indicated that green goods, services and works are costly compared to the less green alternatives, while others indicated that the local market would not be able to deliver on green, since most local suppliers are small. Officials also cast doubt on whether they would be able to deliver large quantities while being able to maintain a high quality.

The procurers, in general, were found enthusiastic and willing to procure green goods, works and services as long as the suppliers convinced them in terms of quality, quantity and consistency in meeting the demands, even if it meant comparatively paying higher prices initially.

Thus, on the demand side for green goods, works and services, it is necessary to tune the market with appropriate supplies, which has to be initiated with appropriate policies, plans, regulations and guidance. Usually, the supplier selection/recruitment is governed by price quotation. While the PRR 2009 allows evaluators to assess bids on the technical and quality aspects, not only price, in practice, in rating the evaluation, the lowest financial bidder normally wins the contract award. The imported goods, works and services with lower price therefore have an advantage over the local products. GPP Bhutan hopes to promote a different reading of the PRR 2009 – one that encourages evaluators to consider value for money across the life cycle of the asset.

#### 4.2 Supply side of public procurement

The main purpose of the supply side study is to find out the availability of green goods and services and contractors for works in Bhutan. It is also to determine if suppliers have the capacity to meet future demands. The supply side study included consultations with the MOE, MOH and MOWHS. In addition, a few suppliers in Thimphu who supplied green goods, works and services were consulted. The study information reveals that there is strong interest and willingness on the part of the government procurers to procure locally available products, even if it is comparatively higher price, provided producers/suppliers demonstrate consistency in quality and supply of the products as demanded.

The findings of the study are presented in the following order: a) parameters considered for acknowledgement of green goods, services and works, b) findings from the suppliers FGD, and c) suppliers' feedback on their interest to respond to green tenders. Additionally, suppliers' feedback on general public

procurement processes and their opinion on the need for training and consultation workshops are also presented. In general, the supply survey responses were on goods and services. No significant information on works could be availed.

#### 4.2.1 List of commonly acknowledged green goods, works and services

Table 4 gives a snapshot of enterprises visited in the field and their ratings, using green parameters adopted by the project in Section 2 of this report. The list of green goods, services and works are classified and presented under their respective categories. Further, a review perspective of the survey information collected from the enterprises on green parameters is provided in Annex I.

Tables 4: Green parameters rating considered in enterprises survey

Enterprise		Green Parameters									
Works	Local	Resource Efficiency	Pollution	Non-toxic	Recycle	Biodegradable	Reuse Waste	Durable Quality	Labour & other Law		
1 Perfect Thermex TMT	✓	✓	✓	✓			✓	✓	✓		
2 Bhutan Bitumen Ind. Pvt. Ltd.	✓	✓	✓					✓	✓		
3 Bhutan Concrete Bricks	✓	✓	✓	✓	✓		✓	✓	✓		
4 Jattu Furniture	✓	✓	✓		✓		✓	✓	✓		
5 Rabten Wire Industry	✓		✓	✓			✓	✓	✓		
6 RSA	✓	✓	✓				✓	✓	✓		
7 Druk Cement Company Pvt. Ltd.	✓	✓	✓						✓		
8 Gyaltsheh Wood Ind.	✓	✓	✓		✓		✓	✓	✓		
9 Green Druk Venture	✓	✓	✓			✓	✓	✓	✓		
10 Yangjung Sonam & Steel Fab. Ent.	✓								✓		
11 Bio Plates	✓	✓	✓	✓	✓	✓	✓	✓	✓		
12 Interlocking Cement Earth Block	✓	✓	✓	✓	✓	✓	✓	✓	✓		
13 Green Road, Bjemina	✓		✓		✓		✓		✓		
14 Eco-Friendly Initiative -Waste recycling	✓	✓	✓	✓	✓	✓	✓	✓	✓		
15 SAINT Gobain	✓								✓		

Goods												
1	P/ling Book Store & Stationary	✓										✓
2	Jattu Furniture	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Kuenphen Stationary	✓										✓
4	Gyaltshen Furniture House	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Yangjung Sonam & Steel Fab. Ent.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Hardware shop	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Samden Vehicles	✓		✓						✓	✓	✓
8	Mawongpa Water solution	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	NGN Technologies (Goods)	✓	✓							✓		✓
Services												
1	Tshenden Hotel	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Garuda-Inn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Densa Hotel	✓								✓		✓
4	NGN Technologies (services)	✓									✓	✓
5	Lhaki General Store	✓	✓								✓	✓
6	Green City Services	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

From a total of 30 enterprises that were interviewed in the three survey sites, fifteen were from the category of works, nine from the category of goods and six from the services. When applying the definition of green goods, services and works, it was observed that all 30 enterprises qualify as enterprises that produce and supply green goods and services.

## 4.2.2 Findings from the focus group discussion with suppliers

### Views on supply of goods

Focus group discussion with eight suppliers confirmed that although there are locally produced goods like construction materials, there is a tendency amongst the builders and contractors to go for imported materials. It is believed that it happens so mainly with misperceptions of non-availability of the products locally and also due to no clear guidance in the policies, rules and guidelines. The same group of suppliers informed that the local TMT rebars procurement is picking up, on knowing the availability and quality of the material. Therefore, awareness and interactive communications is felt crucial in connecting the procurers with the suppliers.

In goods, participants said that all goods like vehicles, office equipment and air conditioning are imported because they are not produced in the country. Controversially, goods like wooden furniture, for which Bhutan has abundant resources, are also said to be imported. While the government procurers insist all wooden furniture are procured locally, suppliers FGD did not agree. The government procurers claim that even tendering processing is not required when the procurement of furniture is from the local wooden furniture SOEs. The suppliers FGD insisted that wooden furniture are imported and even given preferential treatment over Cottage, Small & Medium Enterprises (CSMEs). If this indeed the case, CSMEs will not be able to compete with the larger SOEs in the market, having the price of goods fixed in accordance with its turnover capacity. In absence of an evidential data, the FGD stand could not be complete. Import of furniture from sources other than wood could be mistaken for import of wooden furniture. This item requires clarification in a mediated setting between procurers and suppliers.

### Views on supply of services

In the study of the service sector, all eight participants in the FGD agree that more than 80 per cent of food and drink catering services is procured locally. When it comes to professional services like consultancy services, there was a division in the opinion. For management consultancy, three participants said that local experts provide more than 50 per cent of consultancy services whereas the other five participants said only less than 50 per cent of the services is supplied by the local experts. In case of IT consultancy, five participants stated that local consultants provide more than 50 per cent, whereas three said less than 50 per cent. In providing training services, one participant said 80 per cent or more of the training services are provided by local experts, four said more than 50 per cent and three participants felt only less than 50 per cent of training services are provided by the local experts. Still three participants feel that less than 50 per cent of training services are locally sourced. Strength of the opinions expressed by the FGD participants is displayed below in table 5.

**Table 5: FGD views on procurement of locally available products**

Type of service	Less than 50% sourced locally	More than 50% sourced locally	More than 80% sourced locally
Catering (food & beverages)	0	0	8
Management consulting	5	3	0
IT consulting	3	5	0
Training services	3	4	1



## General views

The FGD also endorse the individual supplier interviewee statement that procurers (public and private) eventually base their decisions on price. Quotation of low price has more guarantees to win the tender than those with quality or considerations of environmental and social benefits. The PRR and BSR have no clear guidance to give preferential treatment to sustainability, environmental and social factors in evaluation of the tenders. The rating is only on technical qualification and financial bidding. Even if one firm qualifies by a high margin from the 2<sup>nd</sup> firm, in the technical qualification, more chances remain with the 2<sup>nd</sup> firm to win the tender if it quotes very low in financial bidding.

### 4.2.3 Challenges faced by local enterprises

#### *Supply of goods – the case of red bricks*

The local enterprises indicated that they face difficulties in competing with same or similar imported products. For instance, in supply of construction goods, enterprises manufacturing concrete bricks pointed out that compared to the red bricks imported from India or Bangladesh, local cement bricks are superior in quality in terms of strength and durability, and in consideration of GHG emissions.

The Bhutan Standards Bureau (BSB), the national regulatory agency for works and construction related goods, quality and standards, has certified that the cement bricks produced in Bjemina Industrial Estate are of high quality. The cement bricks are produced using advanced technology and have minimal negative environmental impacts. No gaseous emissions and minimal solid and liquid wastes are generated. However, the government procurers continue to import mud/clay burned bricks, commonly referred as “red” bricks from across the border. Comparatively cheaper price of the good is an assumed preferential reason.

The cement brick producers, however, pointed out that the main factor of not choosing the local goods is because of the mention of red bricks in the Bill of Quantities (BOQ). The BOQ is an important component of the tender document that gives details of the technical specifications of goods, works and services including required quantity and quality specifications against which the suppliers/contractors quote their bidding rates. The BOQ in turn is prepared by the procurement officials in line with the structural/architectural design of the works and the Bhutan Schedule of Rates (BSR). The works supplier (contractors), although, aware of the available alternative materials in the market, fear to digress from the BOQ specifications to win the contract and to avoid audit observation on completion of the work. BOQ is the integral section of the tender document providing engineering details of the work with specifications of quantity and required materials.

The survey indicated that the procurers generally assumed the local products to be comparatively expensive and inferior in quality than the imported products. The assumptions are mainly based on the higher labour charges in the country and also the historical low capacity to produce and supply high quantity and quality products. It, however, is important to understand that all goods, works and services cannot be produced locally. The ones that is possible to produce locally are also ready to compete in the market. Considerations of transportation and handling costs, transaction costs, taxes, and risk factors in the entire transactions will play a major role in promoting local products in the market.

What is required are policy interventions, generating awareness on the benefits of GPP, and a gradual change of procurement mindset. The procurement policy and rules should encourage procurers to procure available local products. For example, avoidance of specifying red bricks in the BOQ will give an option

for the contractors to suggest procurement of cement bricks to the client agency. The manufacturing of construction materials like concrete bricks, TMT reinforcing bars (rebars), and Cationic Bitumen Emulsion is of high quality and suppliers are capable of supplying any quantity. The local producers possess quality certification from the certifying entities, for example:

- ✓ Concrete bricks possesses certificate of the BSB
- ✓ TMT rebars possesses certificate of ISO 9001 and Bureau of Indian Standards (BIS)
- ✓ Cationic Bitumen Emulsion possesses certificate of BIS (IS 8887:2004)

Focus group discussion with eight suppliers confirmed that although there are locally produced construction materials, there is a tendency amongst the procurers (builders and contractors) to go for imported materials due to limited communication, coordination and more of misperceptions. It is also due to lack of clear guidance from the national policy, rules and guidelines. The same group of suppliers informed that the local TMT rebars procurement is picking up, for a positive note. Materials like glass, plastics and ceramics are not produced locally. So, there is no option than importing these products.

### *Supply of services*

As stated above, all eight participants in the FGD agree that more than 80 per cent of food and beverages catering service is procured locally. When it comes to professional services like consultancy services, there was a split in the opinion. For management consultancy, three participants said that local experts provide more than 50 per cent of consultancy services whereas the other five participants said only less than 50 per cent of the services is supplied by the local experts. In case of IT consultancy, five participants stated that local consultants provide more than 50 per cent, whereas three said less than 50 per cent. In providing training services, one participant said 80 per cent or more of the training services are provided by local experts, four said more than 50 per cent and three participants felt only less than 50 per cent of training services are provided by the local experts.

Local suppliers of goods, works and services indicated that procurers (public and private), in absence of VCA or life-cycle assessment (LCA) capacity and knowledge of environmental and social benefits, eventually base their decisions of procurement on price. Quotation of low price has more guarantees to win the tender awards than those with quality or considerations of environmental and social benefits.

The PRR and BSR have no explicit provisions to give additional points on environmental and social factors in evaluation of the tenders. However there is legal space for the consideration of 'other' characteristics such as quality, durability and indeed sustainability. The key is to have public authorities understand the existing regulations in a new light.

Presently, evaluation is on technical qualification and financial bidding. Even if one firm qualifies by a higher margin from the 2<sup>nd</sup> firm, in the technical qualification, more chances remain with the 2<sup>nd</sup> firm to win the tender if it quotes very low in financial bidding. Point based systems that reward innovative, efficient and sustainable products and services are now required to push forward GPP, or another type of system-correction to supplement the technical qualification substantially or make it a priority. For higher threshold tenders, there is technical pre-qualification norm as per the PRR which screens out firms not qualified technically. Studies need to be carried out if same application can be made on smaller amount tenders.

#### 4.2.4 Suppliers interest and challenges to respond to green tenders

There is a general expectation amongst all suppliers consulted during the field survey (particularly local manufacturing enterprises) that there is a need for the government to provide some form of preferential treatment to local suppliers, if they are to respond to green tenders. For instance, at the moment, there is only the legal provision in favor of products originating in the country in the PRR 2009 is Clause 1.1.2.2 (a), and according to our surveys it is rarely implemented.

PRR 2009, Clause 1.1.2.2 (a):

*In case of any Procurement, goods of Bhutanese origin may be given preferential treatment. Where two or more tenders are equivalent in the light of evaluation methods and factors set out in 5.4, preference shall be given to the bid offering goods of Bhutanese origin provided that the price difference does not exceed five per cent (5 per cent). Use of preferences shall be indicated in the bidding documents. Similarly, a five per cent (5 per cent) margin of preference may be given to the National bidders in case of works.*

The suppliers expressed that although there is interest and willingness among the government procurers to promote green goods, works and services, lack of clarity in the policy, legislations and strategies form a bottleneck. The EDP and the 11<sup>th</sup> FYP are for self-reliance and green economy. Accordingly the PRR and the SBDs should be understood to promote the same greening parameters. Suppliers are of the view that while the government encourages them to support green initiatives, protection measures to discourage cheaper non-green products in the market are not in place. There are also no incentives for supply of green goods, works and services. The suppliers suggest following measures to help more sustainable production towards promoting a green economy:

1. Preferential treatment for green goods, services and works in awarding public contracts;
2. Incorporation of green procurement provisions in the PRR and enforcement of its implementation;
3. Encouragement for procurement of locally produced and BSB certified products (construction materials), in the PRR and BSR; and
4. Leadership by the government in the shift to a green economy and procurement of green goods and services.

Suppliers also provided ideas and examples for the government to initiate measures that may encourage shift in mindsets and up-scaling of production of green goods, works and services in the private sector:

1. Periodical review and revision of PRR, and BSR to embrace innovative concepts like green goods, works and services,
2. Protection for locally manufactured products through tax holidays (green tax breaks and subsidies),
3. Providing government land on lease to support local green production/manufacturing,
4. Preferential interest rates or soft construction loans for green buildings,
5. Green certification by relevant agencies like MOWHS, BSB and NEC, or an established Green Construction/Works Council/Commission/Authority; and
6. Awareness, exposure and training programs to suppliers on public procurement documents and innovative concepts such as green goods, works and services.

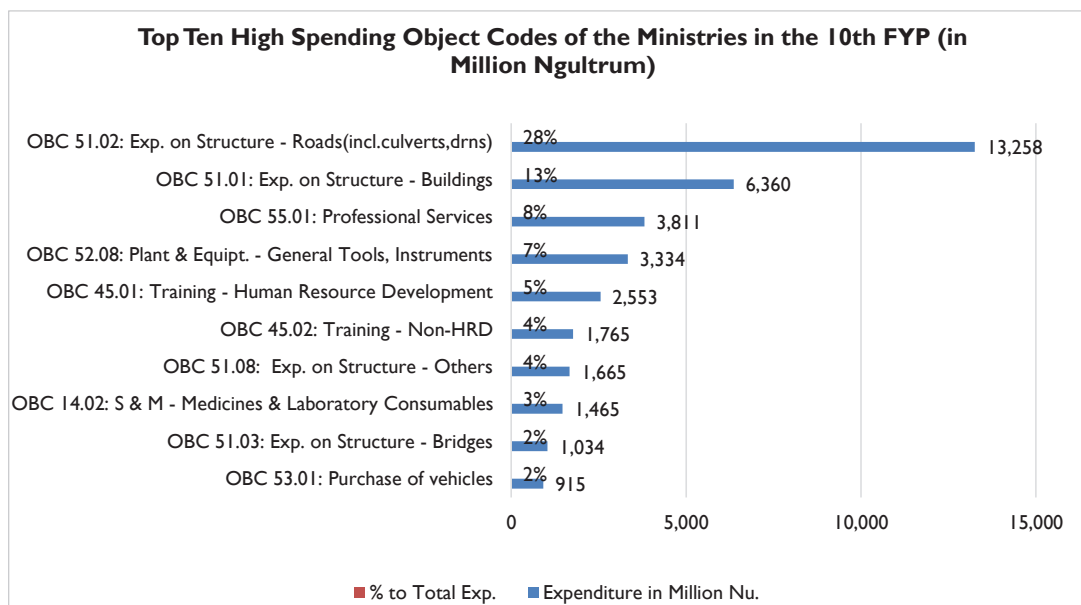
#### 4.2.5 Suppliers feedback on general public procurement processes

1. Need more transparency and consultation in PRR, BSR and SBD revisions. Unilateral government decisions badly affect private sector growth. For example, the private sector's huge investments in furniture production units suffered when the government lifted the ban on import of furniture.
2. Transparency is key and inherent in the move towards green public procurement because it will enhance the delivery of value for money for the tax payer and the government.
3. Need improvement in communication channels between the procurers and the suppliers. Misconception on incapability of the local suppliers with the public procurers is due to limited communication between the two main stakeholders in public procurement.
4. Need periodic review of the public procurement documents and corresponding capacity building programmes for both the procurers and the suppliers.
5. BSR to include locally produced goods, works and services. Suppliers feel that given the opportunity, they will be able to meet the demand. At the moment, most manufacturing units are operating below their full production capacity. The research team verified that the production units are not in full capacity operation at the three survey sites.

## Section 5: Analysis of Data and Findings

### 5.1 Top three highest and frequent spending in 10th FYP

Figure 3 shows that the three highest and frequent government expenditures are on procurement of works such as roads (including culverts, drains etc.) with Nu. 13.3 billion (28 per cent), followed by buildings with Nu. 6.4 billion (13 per cent) and then professional services with Nu. 3.8 billion (8 per cent).



**Figure 3: Top ten high spend areas across the 10 ministries in the 10<sup>th</sup> FYP**

Source: Activity 1.1 report, Quantitative mapping of public procurement

### 5.2 Gaps between demand and supply and a way forward option

The gap between the demand and supply sides is mainly lack of coordination and channel of communication. The procurers do not seem to acquire and utilize updated information on the local markets on availability of goods, works and services. They still perceive there is lack of capacity with local producers/suppliers to meet the demand of green goods, works and services. Suppliers, on the other hand failed to enhance the visibility of their enhanced capabilities to supply green goods, works and services as demanded, with preferential treatment and other incentives considered by the government to compete with cheaper imported products.

The suppliers strongly feel the need of government protection to the local enterprises promoting green goods, works and services. Preferential treatment in the form of green tax holidays, subsidies, low interest rate or soft loans, certification processes, capacity building programs, protection from outside competition and strategic policies and plans, are some of the potential interventions that the government can undertake. The government procurers, however, argue that there are policy measures already in place, in favor of the producers/suppliers to enhance their capacity to compete with imports in the market. The policy interventions quoted are Economic Development Policy (EDP) 2010, Foreign Direct Investment (FDI) Policy 2010, FDI Rules and Regulations 2012 (amended December 2014), Fiscal Incentives 2010 and Cottage, Small and Medium Industry (CSMI) Development Strategy (201-2020).

To this effect, it is very clear that communication and coordination gap is the main issue. Enhancing communication mechanisms to increase awareness on both sides of the procurement ecosystem is seen urgent and vital. Should there be clear communication channels, market consultations, policy guidance, strategic plans and appropriate incentives to the suppliers, to promote green public procurement, both the procurers and suppliers are keen to embark on the practice. Concerted effort to promote green goods, works and services through market consultations, targeted policy interventions and improving communication channels therefore is a way forward option.

### 5.3 Opportunities for procurement-induced green production and consumption

As the global movement to promoting sustainable production and consumption and green public procurement is picking up, the timing appears right to integrate green parameters in the public procurement documents. Both procurers and suppliers are interested and willing to embrace advancing green initiatives in the public procurement ecosystem. The opportunity to implement GPP using the existing public procurement documents is there. The time to act is now.

## Section 6: Value Chain Analysis

Over the years, the built environment in Bhutan has grown rapidly from urbanization and economic activities. The built environment has a bearing on the environment and unless critically managed, the impacts are often irreversible. Therefore, consuming environment friendly construction materials and effective techniques is imperative to address adverse effects on environment. The study on government capital expenditure for 10 ministries in the 10<sup>th</sup> FYP shows that the MOWHS received the largest public procurement budget allocation due to heavy infrastructure development undertakings. In the construction works, construction of roads and public buildings incurred the highest expenditure. Therefore, VCA of two major construction materials has been felt necessary to supplement the preliminary findings of the study.

The VCA focused only on the manufacturing and assembling phases of the production process and hence did not achieve the full scope of the VCA, i.e., the analysis did not take the whole life cycle assessment approach. The VCA of two different local products showed that locally produced construction materials offer value-added benefits. It not only meets national and international quality standards, but also has other benefits, such as, use of energy efficient and eco-friendly production technologies, use of local resources and creation of local employment.

### 6.1 VCA of Bhutan Concrete Bricks, Bjemina Industrial Estate, Thimphu

Although the VCA case study is carried out in the Bhutan Concrete Bricks (BCB) site located in Bjemina Industrial Estate, Thimphu, the findings are similar to those in three other concrete manufacturing units visited by the research team, viz.,:

1. Concrete Manufacturing Unit under Yangjung Sonam & Steel Fabrication Enterprise, Gelephu,
2. Interlocking Cement Earth Block, Druk Soednam Enterprise, Bjemina, Thimphu, and
3. Bhutan Concrete Bricks<sup>1</sup>, Toorsa, Phuentsholing.

From these field visits, the research team learned that bricks could be manufactured from a variety of raw materials using different methods and technologies. Brick manufacturing is labour intensive and/or capital intensive. Technologies can range from manual hand casting process to highly automated machinery processes. Further, it could be single molds compacted by hand or gang molds on assembly belt lines in high-tech manufacturing facilities.

In total, there are around seven concrete bricks manufacturing factories in Bhutan. All the factory proprietors claimed that the quality of their products can compare well with that of the imported “red” bricks. All the four cement brick manufacturing unit personnel interviewed mentioned that they have BSB certification, acquired after testing the quality of their products which included green and sustainability factors.

The BCB manufacturing plant was established in 2007 on an area of 1.5 acres. The concrete bricks are manufactured using advanced technology from the United States of America. Most of the machines used by the factory are hydraulic system. Computer Programmable Logic Controller (PLC) and off bearer are bought from USA whereas, machines like Mixture and Main Block to control block machine are bought from China. Spare parts are procured from India. Types of concrete bricks produced by BCB are:

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<sup>1</sup> Two bricks manufacturing units have same name - “Bhutan Concrete Bricks”. One is located in Bjemina in Thimphu and the other is located in Toorsa, Phuentsholing. The manufacturing units are independent, belonging to different promoters.



1. Porous Bricks 2 Hole (Size 230X110X70 mm. Weight 3.2 kg)
2. Solid Brick 80 mm (Size 240X115X80 mm. Weight 4.1 kg)
3. Hollow Block (Size 390X190X190 mm. Weight 16 kg)
4. Partition Hollow Block (Size 390X190X90 mm. Weight 11.5 kg)
5. Solid Brick 53 mm (Size 240X115X53 mm. Weight 2.9 kg)

#### Raw materials and other sustainability attributes:

The main raw materials used for manufacturing concrete bricks are as follows:

1. Aggregate (8mm)
2. Crushed dust (waste from stone quarries)
3. Cement
4. Plasticizer chemical

Broken bricks can be crushed and reused as raw materials (100 per cent recyclable). Electricity bill is around Nu. 12,000 per month during peak seasons and around Nu. 5,000 during off-peak seasons. The company has 26 employees, out of whom 17 are local day workers and 9 are regular office staff. The unit also employs graduates from TTI (Technical Training Institutes). All employees are Bhutanese.

#### 6.1.1 Features and benefits of concrete bricks over red bricks

Features and benefits of concrete bricks given below compare concrete/cement bricks quality with red bricks. The Bhutan Concrete Bricks upholds different parameters of sustainable materials that are in the Bhutan Green Building Design Guidelines 2013.

##### a. Strong and durable

The clay brick by nature of its manufacturing process hardens from the outside inwards. If the outer face is damaged, it is possible that the softer inner could deteriorate. Concrete bricks on the other hand have same durability strength across the block. The BCB bricks therefore meet IS 2185 Part II for compressive strength and other criteria, certified by the BSB.

##### b. Dimensional accuracy

Generally, concrete bricks are true to size and texture whereas clay (red) bricks can vary considerably in size, shape and texture. Thus, red bricks will need a thicker coat of plaster than concrete bricks to obtain surface finishing. Study conducted by BSB in 2011 found a reduction of 51 per cent cement mortar "masala" in one square meter (1 m<sup>2</sup>) wall plastering with BCB concrete bricks compared to red bricks wall.

##### c. Consistency in strength

Concrete bricks are manufactured using computer (PLC) batching, so every brick has the same ratio and amount of cement, aggregate, crushed dust, and water, leading to consistent strength in every brick. On average, a truckload of BCB bricks has only 1 to 2 per cent breakage. Less breakage in materials means reduction in construction costs.



#### d. Curing techniques

Proper and correct curing is of utmost importance to ensure high quality concrete bricks. Concrete bricks need to be kept moist and warm for the first 24 to 48 hours to ensure full hydration and hardening of the bricks. BCB implements modern and best methods of curing concrete bricks.

#### e. Energy savings/better insulation

Heat resistance (R)-Value is the measurement of a material's capacity to resist heat flow from one side of the wall to the other side. R-values measure the effectiveness of wall insulations - the higher the R-Value, the better the thermal insulation in a room. Walls constructed with high R-value materials help thermal insulation for heat conservation and ventilation for cooling inside the rooms. Offsetting usage of heaters and cooling appliances is energy and money saving. As such, these raw materials qualify to be a green product.

Table 6 shows different R-Values of concrete bricks against other building materials to demonstrate its superior quality.

**Table 6: R-Values of concrete bricks and other building materials**

Material & Size	R-Value
Concrete Block, 4" hollow core	0.97 -1.11
Concrete Block, 8" hollow core	1.28 - 1.70
Concrete Block, 12" hollow core	1.90
Concrete Block, 4" 72per cent solid	1.19
Concrete Block, 6" 59per cent solid	1.25
Concrete Block, 8" 54per cent solid	1.45
Clay Brick 4"	0.44
Gypsum Wall Board 5/8"	0.56
Plywood 1/2"	0.62
Concrete, uninsulated 8" wall	2.50

Source: Bhutan Concrete Bricks Handbook

#### f. Disaster risk reduction

Concrete bricks provide the best resistance of any building material to high winds, hurricanes, and tornadoes due to its weight and responding stiffness, resulting in minimal horizontal movement. Concrete is also fire-resistant (resists the passage of flames, smoke and heat). Concrete bricks are resistant to outdoor moisture in hot and humid climatic conditions because it is impermeable to air infiltration and wind-driven rain.

#### g. Sound insulation

Since concrete is a denser material, it reduces the transmission of sound between walls. The acoustic insulation for clay bricks is not as good as that of concrete bricks. This is because the tiny perforations in clay material allow for sound infiltration. Concrete blocks are much better at providing sound protection because blocks include two of the best sound dampening features - mass and dead air space.

#### h. Low moisture absorption

Concrete bricks have relatively low moisture absorption – about 5 to 7 per cent (when cured properly), whereas clay bricks are very variable, depending on the burning and type of clay. Moisture absorption in clay bricks can range from 6 to 20 per cent. The significance of this is that clay bricks need to be wet

while using in constructions. Otherwise, the bricks absorb moisture content of the mortar to weaken mortar setting value. Concrete bricks can be laid dry. In fact, constant moisture in cement is good for cement adhesiveness and durability.

A Water Absorption Test conducted by the BSB in May 2013 on BCB and GOLD brand clay bricks showed that clay brick has an average water consumption of 18.98 per cent against BCB bricks average water consumption of 6.65 per cent for 2 Hole Porous Brick and 7.61 per cent for Solid 80 mm brick.

#### i. Eco-friendly

Concrete bricks can be considered as a green building material. After the cement production emissions, concrete brick manufacturing process has minimal emissions and waste generation. It is not burned and little raw material residuals generated in the process of mixing and moulding of the bricks can be reused in the next batch of the bricks. Concrete has low volatile organic compound (VOC) emission and does not degrade indoor air quality. With all these and earlier justifications of energy saving and cost effectiveness, the concrete bricks qualify to be an environmental friendly product. In contrast, due to use of fertile top-soil and coal burning in clay bricks production, emitting substantial carbon dioxide (CO<sub>2</sub>) and generating lots of ash and burnt soil wastes, the clay bricks are not green.

### 6.2 Double-glazed glass window assembling unit, Bondey, Paro

Sherab Enterprise is a trading company which was established in 1981. It deals with supply of multiple products, ranging from agriculture, horticulture and forestry tools and equipment to heavy logging equipment. They are also engaged in sawmill operations and manufacturing furniture. It employs around 50 people. It follows the Labour and Employment Act of Bhutan 2007, including the OHS (Occupation Health and Safety) standards.

In 2013, the company established two units of double glazed window assembly, one in Bondey, Paro and another in Babesa, Thimphu.

#### Raw materials and availability:

For assembling double glazed window, following raw materials and supplies are required:

- 1) Timber
- 2) Glue
- 3) Glass
- 4) Nails
- 5) Electricity
- 6) Water, and
- 7) Labour

Timber, nails, electricity, water and labor are locally available. Glass, adhesives and other supplementary materials and tools need to be imported. Based on orders from customers, different quality and size of glasses are selected to assemble into required double glazed windows.

### 6.2.1 Features and benefits of double glazed windows

#### a. Strong and durable

Double glazed windows are stronger than the single glazed windows. When two glasses are put in parallel, it enhances the strength of the glass. Moreover, raw materials used by the assembling unit like Duracell and super spacer have life span of 70 and 40 years respectively.

#### b. Energy savings and sound insulation

Double glazing prevents easy transmission of air and traps heat inside rooms that has passed into the room with sunlight. It also prevents transmission of cold air into the room in winter. This ensures reduction in use of heating and cooling appliances inside the room, saving energy. The double glazed windows also prevent easy transmission of sound thereby preventing disturbances from external noises, if any. Thus, double glazed window is considered a green building component.

### 6.2.2 Market product delivery competition

Due to enhanced awareness of the benefits of double glazed windows, the demand is steadily increasing. The unit creates awareness by participating in trade fairs, construction expos and through media communications. Within the last two years, the unit was able to supply double glazed windows to both government agencies and the private sector.

There are 3 to 4 Indian agents who supply double glazed windows in Bhutan. Though the unit is capable of producing superior quality product, it faces stiff price competition from these Indian agents, due to the need to import glass and pay higher labor charges. The production cost obviously is cheaper across the border in India. The local product, however, has after sales maintenance services. Therefore, the market competition strategy is to highlight advantage of the after sales service. In addition, the company is hopeful for a government preferential consideration for the locally assembled products.

### 6.3 Key features of value addition and benefits of local materials

From the two VCAs carried out, it is evident that the locally produced construction materials have some value-added benefits to offer: a) quality that conforms to national and international standards, b) the products are energy efficient and eco-friendly, c) products are mostly from locally available resources, and d) generates employment and income to local people.

- a. **Durable quality** – concrete bricks are BSB certified and meets IS 2185 Part II for compressive strength and other criteria. It also upholds sustainable parameters specified in Bhutan Green Design Guidelines 2013. Similarly, double glazed windows are stronger than the regular single glazed windows and it conserve heat to save energy consumption.
- b. **Eco-friendly** – concrete bricks manufacturing does not emit gases and generate wastes. They conserve heat to save energy and they are resistant to fire and other disaster elements. Concrete blocks do not degrade indoor air quality with its low volatile organic compound (VOC) emissions. Similarly, double-glazed window ensures heat conservation and provide daylight to prevent energy consumption. It also prevents external sound disturbances.
- c. **Use of local resources** – particularly with concrete bricks, all raw materials is locally sourced.
- d. **Employment and income** – Generates employment and income to local people.

## Section 7: Conclusions

This research has found that there is interest and willingness on the part of procurers to purchase green goods, works and services. The barriers to date are largely due to a very narrow interpretation of PRR 2009 and SBDs. Similarly, the BSR is unclear and confusing to both procurers and suppliers. This has resulted in procurers not leveraging the existing regulations in favor of GPP. The enhanced capabilities of the local suppliers to produce and supply green goods, works and services are also not recognized by the procuring entities. Hence, bridging the communications and collaboration gap between the demand and supply sides of the public procurement ecosystem could result in substantial savings of public resources. Particularly for locally available green goods, the gap is mainly due to procurers' perception on the capacity of local producers not being able to deliver required quantity on a consistent basis, if demanded. On the other side, suppliers presume that procurers prefer imported goods, works and services.

To help local producers overcome some of the looming challenges, the government could consider improving the implementation of their policy interventions in terms of preferential treatment, tax holidays, subsidies, low interest loans, land lease, certification process, and capacity building programs. Where incentives and protections are dysfunctional or not in place, the government must devise realistic interventions.

A phased approach to greening the PRR 2009 and BSR 2013 to incrementally implement green public procurement is recommended:

- ✓ Promote a 'greener' understanding of the text of the PRR and BSR to integrate environmental and social parameters in the procurement procedures,
- ✓ Facilitate better linkages between green public procurement and the existing fiscal incentives (tax holidays, low interest loans etc.) that promote green industry and manufacturing,
- ✓ Work towards clearer communication channels of policy guidance, strategic plans and awareness on procurement procedures to suppliers,
- ✓ Promote transparency and consultation in PRR, BSR and tender document revisions,
- ✓ Promote transparency in setting pre-qualification criteria in the procurement process,
- ✓ Undertake regular capacity building of the suppliers to produce, market and supply green goods, works and services,
- ✓ Enhance the visibility of the local green goods, works and services products to the procurers, through market consultations and other events,
- ✓ Undertake regular market surveys to improve communication and coordination with the suppliers.

## Definitions

**Bhutan Schedule of Rates (BSR):** A publication delivered by the Department of Engineering of the Ministry of Works and Human Settlement prescribing rates for works by individual component, the quality, quantity, and scope of which is governed by the Specifications for Building and Road Works “SBRW”.

**Bidding Documents:** The set of documents sold or issued by the intending employer/purchaser/procuring agency to potential bidders in which the specifications, terms and conditions of the proposed procurement are prescribed. The terms “bidding documents”, “tender documents” and “bid documents” are synonymous.

**Bill of Quantities:** Summary of the units and unit prices of the items proposed under the contract.

**Capital expenditure:** These include appropriations for the acquisition of goods and services, the benefits of which extend beyond the fiscal year and which add to the assets of the Government. Examples are acquisition of land and buildings, land improvements, buildings and structures, plants, equipment and tools, vehicles, etc.

**Consultancy Services:** Expert services provided by the contractor based on specialized expertise and skills as to prepare and implement a project, conduct training, provide technical assistance, conduct a research and analysis, work out a design, and supervise the contract execution.

**Consultant:** An individual or a legal entity entering into a contract to provide consultancy services.

**Contractor:** An individual or a legal entity entering into a contract to execute works, supplies or services.

**Current expenditure:** These include appropriations for the purchase of goods and services for current consumption or for benefits expected to terminate within the fiscal year. Examples are personnel emoluments, medical benefits, special allowances, travel, utilities, rental of property, supplies and materials, maintenance of property, maintenance of vehicles, operating expenses, retirement benefits, interest on loans etc.

**Demand side** – procurers (covering government and other public bodies) who procure goods, works and services.

**Dzongkhag** – District.

**Employer:** The Government agency, which enters into a contract with a supplier, service provider or contractor for procurement of goods, services or execution of works for the Government. The terms “procuring agency” “procuring entity”, “client”, “purchaser” and “employer” are synonymous.

**Environment:** The physical factors of the surroundings of human beings including the earth, soil, water, atmosphere, climate, sound, odours, tastes, and the biological factors of animals and plants of every description including the complex web of interrelationships between the abiotic and biotic components which sustain life on earth.

**Fiscal incentives:** Policy measures implemented by the Government such as: tax holidays; import exemptions; sales tax exemptions; reinvestments; provision for R&D expenses to be tax deductible; and rebates for environmentally friendly technological up-gradation, to promote sustainable domestic production of goods and services also provide a framework for the growth of clean industries and social protection through value creation in the form of jobs and resilience of the economy.

**Five Year Plan:** A developmental plan timeframe followed for a five-year period. Bhutan embarked on its five year developmental plan in 1961 and the present plan period is the eleventh in the series (July 2013 – June 2018) known as the 11<sup>th</sup> Five Year Plan.

**Goods/services** – Refers to generic classification of activities that is goods and services combining like; plant & equipment in constructions, maintenance of property (buildings, vehicles, roads, plantations, equipments, water supply & sewerage, play fields, etc.), meetings & celebrations, survey/census, hospitality & entertainment, etc.

**Goods:** Any object in solid, liquid or gaseous form that has an economic utility or value, which can be exchanged or traded.

**Government agency:** An entity of the Government whose source of funding is the Government.

**Green economy** – An economic activity “that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.”

**Green Public Procurement:** A process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured.

**Gross National Happiness (GNH):** The development philosophy of Bhutan.

**Intergenerational equity:** A concept that says that humans ‘hold the natural and cultural environment of the Earth in common both with other members of the present generation and with other generations, past and future’.

**Life Cycle Assessment (LCA):** A tool for the systematic evaluation of the environmental aspects of a product or service system through all stages of its life cycle. LCA provides an adequate instrument for environmental decision support.” The International Organisation for Standardisation (ISO), a world-wide federation of national standards bodies, has standardised this framework within the series ISO 14040.”

**Lowest evaluated bid:** The bid which offers the best value for money, evaluated on the basis of various objective criteria set out in the bidding document. It does not necessarily mean the “lowest quoted price”.

**Ngultrum (Nu.):** Unit of Bhutanese currency.

**Procurement:** The purchase of goods, services or the engagement of contractors for execution of works by procuring agencies.

**Procurement cycle:** Cyclical process of key steps when procuring goods or services, from identification of a need and conducting market analysis through to the process of selecting the supplier, managing their performance and reviewing lessons learnt.

**Procurer/Procuring agency/Procuring entity/Purchaser:** See Employer.

**Public Expenditure Management System (PeMS):** Current online Government accounting system that controls and monitors the accounts of all the agencies.

**Services:** Consulting and other services.

**Socio-economic development:** The process of social and economic development in a society.

**State Owned Enterprise (SOE):** Any enterprise with state ownership, a distinct legal form (separate from the public administration) and having commercial sales and revenues.

**Supplier:** An individual or a legal entity entering into a contract for the supply of goods or services.

**Supply side:** Suppliers/contractors/service providers who supply goods, works and services to government and other public bodies.

**Sustainable Consumption and Production (SCP):** The use of services and products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not jeopardize the needs of future generations.

**Sustainable development:** Development that meets the needs of the present generation without compromising the ability of the future generations to meet their own needs.

**Sustainable products:** Those products providing environmental, social and economic benefits while protecting public health, welfare, and environment over their full commercial cycle, from the extraction of raw materials to final disposition.

**Sustainable/Sustainability:** The ability to maintain a certain status or process in existing systems. The most frequent use of the term "sustainability" is connected to biological or human systems in the context of ecology. The ability of an ecosystem to function and maintain productivity for a prolonged period is also sustainability.

**Value Chain Analysis:** a process where a firm identifies its primary and support activities that add value to its final product and then analyze these activities to reduce costs or increase differentiation.

**Value for Money:** A term used to assess whether or not an organisation has obtained the maximum benefit from the goods and services it both acquires and provides, within the resources available to it.

**Work/Works:** Any activity involving construction, fabrication, repair, overhaul, renovation, decoration, traditional Bhutanese painting, installation, erection, excavation, dredging which make use of a combination of labour, machinery, equipment, material and technology.



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# Annexes

## Annexure 1. Write up on the list of green, goods, services and infrastructure

### 1) Gyaltshen Wood Industries (Gelephu)

The company produces a wide range of wood-based products such as plywood, block boards, mold bits, orange caret, flush doors and joinery. The company also runs a sawmill and a showroom for displaying their products.

#### Long life and is durable

The company manufactures various sizes, dimensions and designs of quality products from the best forest wood of Bhutan. The products are of both UF (Commercial/MR Grade) and PF (B.W.R/ Waterproof). In addition, the products are reliable, durable with strong bonding and high tensile strength. The other quality standard that their wood-based products comply with are that they meet JST standard, have QK quality check, and are trouble free, powder free, termite free and borer free.

The company has invited relevant government officials from the Bhutan Standards Bureau (BSB) to carry out quality and price checks on their products and the officials have certified the company's products far superior than those imported from outside the country. One of the main reasons for high quality is due to the use of quality raw materials. However, the price of the product is found relatively expensive compared to the imported goods due to high labour cost in the country. Nevertheless, the company provides following benefits/facilities to its customers:

- 30% discount on every purchase of plywood, block board & flush doors
- Arrangement of insurance on behalf of the purchaser (esp. for bulk purchase)
- 50% advance payment along with supply order and final payment on/or before lifting time
- Dipping charges @ of Nu. 8.95/sqm & Nu. 0.83/sqft only.

#### Are made wholly or in part by domestic Bhutanese enterprises

The product is 100 per cent manufactured in the country by a Bhutanese enterprise. It uses finest local raw materials (wood), which are bought from NRDCL (Natural Resources Development Corporation Limited) of Bumthang, Mongar, Lhuentse and Zhemgang. Gyaltshen Wood Industries uses various types of tree species for their products. Among the broad leaves, Champ, Teak, Sal, Sisoo, etc are popular and in the Mixed Conifer family, Blue pine, Hemlock, Spruce, Holog, Khokan, etc. Nails, handles, staple machines etc. are also bought from local market. Only small components of raw materials like glue chemicals that are not available in Bhutan are imported from India (Kolkata and Siliguri).

#### Employs Bhutanese citizens and follow labour laws

The enterprise employs mostly Bhutanese employees and follows the local Labour and Employment Act of Bhutan 2007 including the OHS (Occupation Health and Safety) standards. There are regular checks carried out by the MOLHR to see that the company follows local employment laws and that working conditions are up to required and acceptable standards. Presently, the company employs 40 people but only six are non-Bhutanese.

### Conserve resources like water and energy

Most of the machinery used by the company is modern and energy efficient. The monthly electricity bill is approximately Nu. 30,000 to 35,000 for the whole company, including the administrative block. Water is used for seasoning of timber, wood core, pressing etc. The monthly water bill comes to around Nu. 10,000.

### Pollution, (land, water and air) and harmful/negative impact on environment

The factory follows the NEC requirements and there is not much pollution except some dust pollution. For boilers, they have put high chimney with canopy with net inside on the top. The smoke emitted from the boiler is very little. Officials from NEC (National Environment Commission) visit the factory once in a year to check on the requirements.

### Biodegradable and reuse of waste product

Almost all the products manufactured are biodegradable as it is made out of wood except nails and handles/hinges/knobs etc., which comprise very small component. All the wastes from the manufacturing unit are reused as following:

- Saw dust generated is reused for boiler.
- Lops and tops of the woods are also used for boiler
- Ash generated is biodegradable and do not harm plants. In fact it is good for the environment. Local people take the ash from the factory and use it in their kitchen garden as fertilizer.

## 2) Green Druk Venture (Charcoal Manufacturing Unit, Gelephu)

The Green Druk Venture manufactures charcoal. It was established in year 2012. The unit has 33 kilns. Presently they are using only 12-15 kilns a day because of shortage of human resources. One kiln can produce 250 kilos of charcoal at one go. It takes 12-13 hours to manufacture charcoal depending on the quality of wood.

### Reuse of waste product

The raw materials are sourced locally. The raw materials used by the unit are rejected lops and tops of woods/timber and waste/rejected wood pieces from NRDC and other private enterprise like sawmills and furniture houses. The unit has permit/work order from NRDC to pick up wood waste from different sites or areas.

### Employs Bhutanese citizens and follow labour laws

The company employs 18 people, of whom 10 are non-Bhutanese. This is mainly because the company is not able to find interested local people to carry out the work.

The unit follows labour laws of the country including OHS requirements. Regular checks are carried out by MOLHR to ensure that requirements are followed.

### Products are partially or wholly produced by Bhutanese enterprises

The unit sells its product to big Bhutanese companies like SD Eastern Bhutan (Samdrup Jongkhar), Ugyen Ferro, Druk Ferro, Druk Wang, Tashi Metals and others in Pasakha. No market problems are reported as there is enough domestic and international market. The only problem that the company faces is shortage of labour due to which, it is not able to use its optimal production capacity.

With regard to quality and price of the product, it was reported that feedback from its customers has been positive. The price is accordingly a bit higher compared to the coal imported from India because of its superior quality.

#### Biodegradable/reuse of waste product

The unit does not have much waste except little ash. The ash is supplied to the farmers/villagers free of cost to be used in their garden/field as fertilizers. The charcoal waste from the oven is usually bought by people who are doing constructions for earthing purpose.

#### Use of energy and water

The usage of energy and water consumption is also very less. The unit has two electric chopping machines. The monthly electricity bill comes to approximately Nu.2,500 including factory lighting.

The usage of water is also very limited. The unit uses approximately two buckets (20 liters each) of water for one kiln, which manufactures 250 kilos of charcoal at a time. The water is completely soaked by the heat so no waste. The unit uses water from the nearby stream using water pump. No water or soil pollution is observed.

#### Pollution

The unit does not emit much pollution. When they burn the wood to manufacture charcoal, there is smoke emitted from the kiln for duration of 2-3 hours. However, the smoke emitted is very less and they said this is due to a control technique they use for manufacturing the charcoal. So far, there has been no complaints from the nearby settlement on any sort of pollution from the unit. The unit follows the requirement of NEC. Environmental clearance from the NEC is issued after regular interval checks. For every renewal of license, NEC carries out major checking. There is no sound and dust pollution.

### 3) Yangjung Sonam and Steel Fabrication Enterprise, Gelephu

The enterprise was established in year 2012. The unit got certification from Bhutan Standard Bureau (BSB) for its quality of products.

The unit deals with six different products:

#### 1. Concrete bricks

Six different sizes of concrete bricks are manufactured with hydraulic semi-automatic machine. The strength of the concrete bricks manufactured are supposed to be much better than the red bricks that are imported.

#### 2. Tiles -

The unit manufactures four different types of tiles (a) Cadbury Red (Area 1sqft, 25 mm) (b) Jumbo Colorado (Area .0444, 60mm) (c) Eupharates (Area .0390, 60 mm) and (d) Zig Zag (Area .0339, 60 mm, 80mm, 100mm).

To manufacture bricks and tiles, the unit uses local raw materials like cement and stone dust. The cement is bought from Lhaki cement and stone dust from 4 different private stone crushing units in Gelephu area.

### 3. Concrete door frames

One of the most important features/attraction is door frames manufactured by the unit which is water friendly as it is made out of concrete. The doorframes are exported to India and there are also Bhutanese customers who use it for their toilet and bathroom doors.

### 4. Steel and aluminum fabrication

### 5. Marble dealership

### 6. Paper recycling (temporarily closed)

Paper recycling unit is temporarily closed due to lack of market. The unit manufactures paper shopping bags, file and envelopes. The raw materials used by the unit are paper waste from schools, offices and private houses. They even used mobile voucher waste cards and pieces of clothes from tailoring shops. It was reported that raw materials are available. It uses a simple machine which is bought from Kolkata. Reasons for suspending production are due to high labour cost, and lack of market due to stiff competition from imported plastic substitutes.

## Pollution

There is not much pollution from the unit except some sound pollution, which is generated from the fabrication work and brick manufacturing machine.

## Employs Bhutanese citizens and follow labour laws

The unit has 28 employees including 12 Technical Training Institute (TTI) graduate (Mechanics). These TTI graduates are employed through GEP (Guaranteed Employment Program) of Ministry of Labour and Human Resources (MOLHR) for three years term. From 28 employees, eight are non-Bhutanese. The enterprise follows local labour laws including General Rules and Regulations on OHS in Construction, Manufacturing, Mining and Service Industries 2006. There is regular check from the officials of MOLHR to see the unit adheres to the requirements.

## Energy and water consumption

Electricity is mainly used for fabrication works. It was reported that monthly electricity bill ranges from Nu. 1,900- 2000. Monthly water bill ranges from Nu. 800-1200. It is quite low because if the information is correct, it is even comparable to a normal household use.

## Waste

The unit has very limited waste. The main waste is from the fabrication work, which is around 30 to 40 kg scrape in 3 to 4 months. The wastes are sold to the local scrape dealers.

## 4) Bio Plates, Gelephu

### Made wholly by domestic Bhutanese enterprises and other advantages

Bio Plates manufacturing unit is located in a small village just next to Gelephu town. The unit was established in year 2014. The unit produces different sizes bio plates, spoons and bowls. The products are lightweight yet strong, microwave safe, resistant to hot and cold and suitable for hard/liquid food. The product is sold at a reasonable price.

### Use of waste and other advantages

The products are made out of fallen/dropped areca nut leaves. Gelephu is a malaria prone zone and fallen areca nut is a problem for people as it becomes good breeding ground for the mosquitoes. The health officials always advised local people to dispose the fallen areca nut leaves or at least hang the leaves from a height, so that water do not accumulate and become a breeding ground for malaria spreading mosquitoes.

Establishment of the unit has been a great relief for both malaria control officers and the villagers, especially rural women, who are engaged in taking care/disposing off the waste. This is because now the rural women not only have a place to dispose their waste but also earn income from the waste.

In the beginning, the unit use to go to villages and collect the raw materials (fallen areca nut leaves) from the villagers. They pay Nu. 0.50 per leaf, but now the villagers are aware of the unit and they collect and bring the leaves to the unit whenever they come to town for shopping. The unit pays them Nu.1 for each leaf.

Therefore, the establishment of unit has many benefits.

- Provide market and value for waste leaves
- Improve poverty alleviation through improving lives of people, especially providing additional income for women
- Within six months of the unit's established, it has helped more than 500 households
- Supports government and global efforts to combat environmental degradation and contamination
- Supports vector Borne Disease Control Program, a solution for controlling parasitic mosquitoes which spread malaria
- Expected to substitute import and will reduce INR dependency

### Are not harmful or have minimal negative impact to natural environment

The products are manufactured in a sustainable manner. The aim of the unit is to reduce negative impact on environment and generate socio-economic benefits by manufacturing and promoting innovative eco-friendly areca leaf products, produced with sustainable resources. The products are 100% natural and no chemical are used at any stage. Besides this, the products have many other advantages like 1) substituting hazardous plastic and thermocolplates 2) supports carbon neutral efforts (each kg of thermocol creates 6kgs of CO<sub>2</sub> emission).

The products are 100 per cent biodegradable. However, the unit uses small amounts of polythene (thin plastic) bought from Kolkata to wrap their products to keep it dry. Other packing accessories are carton and sack which is biodegradable and reusable.

### Helps conserve resources like water and energy

The unit uses energy efficient machine, which was bought from Chennai, India. The products produced by the unit are hygienic as it is produced using High Precision Heat Press Machine. The monthly electricity bill comes to around Nu. 1,800 to 2,000

The usage of water is also not much. Maximum monthly water bill comes to around Nu. 200-380. the water in the tank to soak the leaves is reused twice. Further, in summer water requirement is even less as rain water is harvested for this purpose.

### Employs Bhutanese citizens and follow labour laws

The establishment is still operating at a small scale. There are only two permanent Bhutanese employees. The enterprise hires day workers and depending on the work the number of day workers fluctuates. Similar stories of lack of interest from Bhutanese people to work in such units were expressed.

### Waste from the unit

There is no pollution or waste from the unit that is harmful to the environment. The wastes are biodegradable. In fact, the waste materials (bit and pieces of leaves) from the unit can be made into compost/manure, which could be packed and sold in the market. However, at the moment, the unit has not initiated it but plans to do it once the unit expands its production scale.

## 5) Gyaltshen Furniture House

The unit uses local raw materials and manufactures furniture. The timber are bought from NRDCL, sawmills and community forests. The unit is facing strong competition from imported furniture. It is reported that their furniture are superior quality than imported furniture. When it comes to price, furniture produced in Bhutan are more expensive than imported furniture because of the quality and high labour cost. Most Bhutanese people prefer cheaper imported furniture and their decision are not based on quality.

The unit has invested on machines, which produces better quality finished products. Further, these machines consume relatively less electricity and generate less dust and noise.

### Employs Bhutanese citizens and follow labour laws

The enterprise has 33 employees, out of whom 22 are Bhutanese and 11 non-Bhutanese. The unit employs TTI (Technical Training Institute) graduates of Dolong, Dekeling under Sarpang dzongkhag with carpentry background. These graduates are hired under the GEP scheme of MOLHR.

On labour laws and OHS requirements, the unit has been one of the first enterprises in Gelephu to comply with labour laws and regulation. They have employee benefits with established internal services rules. MOLHR makes regular visits and are satisfied with the enterprise as the enterprise adheres to all the requirements. They have received good feedback from ministries like MOLHR, MOEA and DRC.

### Pollution:

- Sound pollution: Sound pollution is generated from the surface planner which can be heard only within 50 meters roughly.
- Dust pollution: There is hardly any dust generated as the unit is using dust protection devices. The unit uses air bags that suck all the dust into bags. The dust is sold to poultry farm as flooring. Lops and tops of waste from woods are supplied to Green Druk Venture as raw materials for manufacturing charcoal.

### Toxic

The unit uses chemicals like 1) Melamine polish 2) dendrite 3) other sprits. These chemicals are used in limited amount and bought from local suppliers like Bhutan Distributor Phuentsholing, which is the sole distributor in Bhutan.



## 6) Tshenden Hotel

The enterprise was established in January 2001. The unit has food, lodge, catering, conference and bar services. On an average, the enterprise carries out catering services twice a month, worth Nu, 50,000 to 200,000.

The unit buys its vegetables, grocery and other hotel accessories like bed, mattress, bed sheets, pillowcase etc. from local markets.

### Waste from the unit

The hotel segregates its waste like glass, plastic and cartoon boxes etc. and sells to local scrap dealers. So there are no issues of waste from the unit.

### Water and energy consumption

On consumption of water and energy, the hotel has installed energy efficiency and quality appliances such as geysers, AC, fans, fridges, LED bulbs in the hotel. The monthly electricity bill during summers comes to approximately Nu.12,000 and winter around Nu. 8,000.

The monthly water bill for the hotel is approximately Nu.1,400.

### HR and labour laws

One of the main challenges the hotel is facing is shortage of staff, especially Bhutanese. Besides the post of general manager and receptionist, most Bhutanese are not willing to take up other jobs, and so the hotel is understaffed. Due to this reason, they run the hotel with non-Bhutanese staff, especially for house-keeping, cooking, and waiting. The Hotel has 10 employees, out of whom 8 are non-Bhutanese. The hotel provides three meals a day and place to stay for some of their employees apart from the salary and other perks. Staff issues are discussed with officials of MOLHR. The hotel follows all the requirements of the Labour Act and OHS requirements. Officials from MOLHR come to the unit for inspection approximately three times a year. Further, BAFRA inspections are conducted once or twice in a month.

## 7) Kuenphen Stationery

The enterprise was established 10 years back. They are involved in retail business of stationery items like note books, photocopy papers, cello tapes, stick files, pocket files, pencils, sketch pens etc.

The enterprise has never participated in complex government tenders so they have very limited idea about it. The unit has supplied stationery items to autonomous agencies like AWP, RBA, BNBL, BCD (Bhutan Centennial Distillery) on piecemeal basis.

All the stationery items are imported from India. They estimated that 70 per cent of the items they import (like papers, notebook, pencils etc.) are environment friendly. Rest 30% could constitute plastic or non-degradable items. The unit informed that stocks that they are not able to sell are returned to the suppliers after certain period.

## 8) Perfect Thermex TMT, Phuentsholing

In 2014, Lhaki Steels & Rolling Pvt. Ltd took over the lease of three other companies like Bhutan Rolling Mills Pvt. Ltd, Bhutan Steel Industries Ltd, and Druk Iron and Steel Pvt. Ltd. Under this arrangement, all steel manufacturing units of Bhutan came under one umbrella.



### Long life and is durable

One of the main aims of bringing all the steel manufacturing units under one umbrella was for product standardization and economies of scale. The company is confident of meeting all local steel demand.

After the merger, the company has upgraded their laboratory and invested in improved production machinery. Testing machine called Spectro Meter are bought from Germany and installed. Quality parameters can be set and the machine can test the quality of their products as production takes place and so the uniformity of quality standards are maintained.

Although the TMT rebars produced in Bhutan are of ISO 9001 and meets BIS (Bureau of Indian Standards) standards. Till now, the domestic mega hydro power construction projects have imported TMT rebar as they had reservation on the local TMT rebar, especially on chemical parameters. A team of experts (third party) from Delhi, India carried out chemical testing on the product. Continuous random testing had been carried out for more than six months and the quality and the price of the product are now accepted and approved as comparable to international standards.

### Conservation of water and energy and less pollution

The company also upgraded their rolling mill by investing Nu. 160 million. Earlier they had to reheat the billets in furnace where huge amount of diesel was used. To reheat one metric tone of billets, approximately 50 liters of diesel (furnace oil) is used. Now with new technology, it not only saves time and resources but it has curtailed pollution. With the new technology, as soon as billets come out of the continuous casting machine, it is cut to size and fed into the rolling mills and so reheating is not required. There is no fume emission due to reduction in this production step with the introduction of the new technology.

All TMT rebar in Bhutan are manufactured using hydropower, which can be termed as green.

To produce the TMT rebars, usage of water is minimal as it is recycled. They replenish water to compensate for the evaporated amount. The company uses river water for their factory.

NEC and MOEA are very strict on safety and environmental requirements. These agencies check emission level from time to time and if the company does not meet required standard, the company has to shut down. The company uses canopy with air filter above the furnace to reduce air pollution. The company strictly adheres to the requirement of NEC. In addition, one environmental officer is employed by the company just to specifically see that company does not deviate from the NEC requirements.

### Employs Bhutanese citizens and follow labour laws

The company has 114 Bhutanese employees including staff at the head office. The company has employment rules and regulation in place that stipulate employee benefits and are developed according to the labour laws of the country.

The company also strictly follows the OHS requirements. Once in two months officials from NEC and MOLHR visit the company for compliance checking. One environmental officer from NEC is stationed at Pasakha Industrial Estate to ensure that the companies follow environmental regulations.

### Company Waste

Wastage is in the form of "slag" (fine particles of dust). They use it for land filling within the factory premises.

Non-toxic – for lab chemicals, the company has to comply with Drug Regulatory Authority (DRA) regulations. Strict monitoring is done by DRA to see that requirements are complied.

Mill scale, which is wastage from the factory, is collected and sold to the Ferro plant, which uses it as their raw materials. So there is very minimal waste and another company uses most of the waste as raw materials.

## 9) Bhutan Bitumen Industries Pvt. LTD

Bhutan Bitumen Industries Private Limited is a major partner for the road industry. It was established in 2008 and is registered under the company act of the Kingdom of Bhutan 2000. The company BBI (P) L is manufacturing a range of Cationic Bitumen Emulsion certified by Bureau of Indian Standards (IS8887: 2004). The main business philosophy is to develop chemical technology to improve the performance and life of asphalt pavements.

### Technology used

The plant is fully automated. Each formulation-related parameter (i.e. material flow, pH of water phase, emulsion, temperature and so forth) are continually measured, recorded and automatically adjusted through Programmable Logistic Control and Drives. This ensures a high, consistent production quality and exceptional formulation flexibility. It also provides room for detailed quality control follow-ups. .

The plant is equipped with the best Dozing Pump, Thermax Boiler, etc. and it uses number one Collide Mill from Germany.

### What is Bitumen Emulsion?

Bitumen globules are dispersed in water with the help of emulsifier to produce bitumen emulsion, emulsion that is classified as cationic. It is workable in wide range of temperatures. As it does not require heating during application, it can be used with cold/damp conditions and almost all kinds of aggregate. Hence it is very friendly and easy to use.

### Product and Usage

BBI (P) L markets the Cationic Bitumen Emulsion in the brand name BHUBIT. Rapid Setting Emulsion (BHUBIT-RS) characterized by quick deposition of binder with road surface and aggregates. It is generally used for surface dressing, penetration macadam, tact coat, fog seal and quick repair.

Medium Setting Emulsion (BHUBIT-MS) contains deposition of binder that is proportionately delayed to permit mixing with clean coarse aggregates. Generally used for tack coat, fog seal, open graded premix and for soil stabilization.

Slow Setting Emulsion (BHUBIT-SS) is an Emulsion in which the rate of binder is sufficiently delayed to allow mixing with aggregates before binding to form into continuous adhesive film without stripping. It is also used for tack coat, fog seal, prime coat slurry seal, open and dense graded premix, for dust binding and soil stabilization.

### Environment friendly

The products are reported to be environment friendly because it has longer road life and ease of handling. There is no need to heat emulsion or aggregates. At one go, 300 meters of road can be constructed in an hour. It is environment friendly as it uses very little energy and water. Further there is no pollution and waste. It is a proven technology used in many developed countries like the US, Europe and Australia. As per the Indian road research, using bitumen reduces 10-15% of the construction cost. No heavy equipment are needed to produce bitumen emulsion

All process is controlled and monitored by computer (highly automated). There is also a quality control room where each batch of production is checked at the end of the production line before filling the finished product into barrel for selling.

#### HR:

There are ten employees, out of whom one is non-Bhutanese. The company adheres to labour laws and OHS requirements. Officials from MOLHR, Trade and Industry and NEC carry out checking once a year.

### 10) Bhutan Concrete Bricks

Concrete bricks are manufactured, using fully mechanized technology with hydraulic compression under 100 metric tons, compact, firm and ready to use for any construction purpose. These concrete bricks are similar to the commonly used clay bricks in shape and can be utilized in the same manner as red bricks.

#### Long life and is durable

BCB bricks are made of high quality sand and cement. The finished products are more robust, superior in quality, strength and durability compared to the conventional red bricks. Moreover, red bricks are solely dependent on import.

It is reported that if BCB bricks are used, there is 40% overall cost saving compared to the red bricks imported from India. This is because of the difference in volume of the local brick and cost saving at finishing stages.

BCB has proven results of stability and reliability for any kind of structural works. Their products have met all official tests and proven many physical tests demonstrated from time to time. Bhutan Concrete Bricks (BCB) product is therefore certified by Bhutan Standard Bureau for use in all types of constructions within the government executed projects, outsourced projects, private and domestic need.

#### Raw materials

BCB uses raw materials that are purely renewable and locally sourced.

It is conceived with the innovative idea of substituting many imported products used by construction industry. Bhutan Concrete Bricks, a small scale industry based in Phuentsholing was started with aim of reducing trade dependency on our neighbors and subsequently curb the outflow of Indian Rupee and generate local employment.

#### Environmental friendly

- Very environment friendly – no sound, dust or environment pollution
- No air, water and land pollution as it uses all natural raw materials

#### Human Resources

The unit has 13 employees, out of whom 7 are non-Bhutanese. The enterprise operates under the Labour Act. OHS requirements are being followed. Regular checks are carried out by officials from MOLHR.

### Usage of resources like electricity and water.

The unit does not use much water and electricity. The unit is located next to Toorsa river so usage of water is from the river and it does not share the drinking water source. Monthly electricity bill comes to approximately Nu. 6,000.

## 11) Jattu Furniture, Toorsa, Phuentsholing

Jattu Furniture house is located near Toorsa river, Phuentsholing. The unit runs sawmill, timber seasoning unit, furniture manufacturing and assembling unit and showroom. It was informed that value addition done by the unit is more than 45%.

The unit manufactures both traditional and contemporary furniture catering to both local and international market. It boasts of excellent craftsmanship with employees with skills to craft intricate traditional Bhutanese carved designs and paintings. The unit manufactures many different products ranging from large scale supply of doors and windows for construction, school furniture and contemporary home furnishings.

The furniture produced by the unit also demonstrates impeccable quality of carvings and painting. All raw materials used in the traditional furniture are locally produced. Even the paint used for the furniture is made from natural dyes.

Employees of the unit are all Bhutanese and they follow the labour laws and regulations of MOWHS. OHS requirements are also being followed.

### Waste

The company has zero waste – all waste are reused and recycled. Moreover any wastes from the factory are pieces of wood or wood dust, which is biodegradable.

## 12) Rabten Wire Industry

The enterprise was established in 2006. The enterprise imports raw materials like wire rod, coil and GI (Galvanized) wire from India and manufactures barbed wire, wirenails, binding wires and all sizes of nails. The unit supplies its products directly to hardware stores in Bhutan. The enterprise is reported to achieve about 40% value addition on raw materials.

It was reported that compared to imported goods, their products are of much superior quality. Products have better strength, sharpness and are rust-free. Further, when customers buy such products locally, there is less loss in transportation. However, the price is lower across the border because of cheap labour. However, the quality is also compromised due to high moisture content causing products to rust quickly.

However, as these items are not main construction materials, Bhutanese people find it more convenient to purchase them across the border when obtaining other construction materials. In addition to lower prices, manufacturers also face a hurdle in overcoming the long term relationship and lines of credit that buyers have with vendors across the border.

- Energy – Nu. 20,000 - 30,000 per month

### Wastage

- Not much wastage.
- Saw dust is used for polishing and to clean the nails. So saw dust which is a waste of another firm is used. The sawdust is reused for several batches of nail cleaning. Once it turns completely black in color they burn it. The wastage from sawdust is minimal (maximum 4-5 truck load of sawdust is required by the unit in a year).

### HR

The enterprise has 18 employees, out of whom 6 are non-Bhutanese. The enterprise operates under the labour laws of the country and fulfills all OHS requirements.

- Sound pollution – earplugs used
- MOLHR visit the factory 2-3 times in a year.

NEC requirements need to be followed and it is monitored. NEC carries out regular checks on how the raw materials are stored and wastes are disposed.

### 13) RSA (Marble Processing Unit), Phuentsholing

The unit transforms rough marble blocks into quality tiles and slabs. RSA selects the best stones from places like Egypt, Spain, Turkey and India etc. and shape them into quality tiles and slabs in Bhutan using hydroelectricity.

RSA Marble Processing Unit is only company in Bhutan that locates/selects the marble blocks/best stones from Europe, Africa and Asian Countries and transforms them into quality tiles and slabs in Bhutan using hydroelectricity. The unit also has their own quarry at Gidakom, Thimphu, Bhutan, from which they extract marble blocks. The company uses state-of-the-art marble cutting, processing and polishing technology to transform marble blocks into finished products. The product sold by the company meets international quality standards and it is offered at the best price in the subcontinent. The unit does about 40% value addition in Bhutan.

The company operates under the labour laws of Bhutan and follows all OHS and other requirements. Officials from MOH, MOLHR and NEC carry out regular checks and inspections.

### Pollution

One of the main wastes from the factory is “slurry” (which is a mix of water and dust). The unit has been disposing the waste in a ditch behind the factory as per the NEC requirement. The waste can also be used as fertilizer for tea garden as it has high calcium contents. However, the demand for the waste from across the border has been less.

### 14) Druk Cement Company Pvt. Limited

The company was established in 1991.

All raw materials are bought locally except clinker, which is imported from India. Gypsum is bought from Samdrup Jongkhar, packaging bags from Dungsam Polymers, chemicals from Karma Tshongkhang.

The company operates under the labour laws of the country and follows all OHS requirements. The company has 30 employees, out of whom 14 are Bhutanese and 16 are non-Bhutanese.

The company is using efficient and environment friendly machine to manufacture its product. Earlier the company was using VSK (Vertical Shaft Kiln which is a blower based machine), where cost of production was very high. This has been replaced by Rotary Clinker which is more energy and water efficient and gives better quality product with less cost of production. Rotary Clinker is also more environment friendly than VSK as it produces less noise, smoke and dust.

The company is regularly visited by officials from the National Environment Commission (NEC). The company reported that they do not produce any environmentally harmful waste materials.

### 15) Interlocking Cement Earth Block, Druk Soenam Enterprise, Thimphu

The Interlocking Cement Earth Block (ICEB) relies on mechanical interlocking and cement grout rather than conventional mortar bed used in the bricks masonry works to achieve structural stability. Cement grout is only 7.5% of the mortar used. Moreover, the walls constructed with interlocking cement earth block do not require plastering owing to its fine machine finish except in the areas where it is exposed to water continuously.

The ICEB can be laid dry and are automatically aligned owing to its interlocking arrangement with the provision of positive and negative frogs on the top and bottom of the surface of the block, thus eliminating skill labour requirement in the block laying process yet achieving higher productivity rate than laying conventional Indian bricks.

Therefore, the overall construction cost is said to be reduced by 30-35% while the direct cost of the block is cheaper by about 15-20%.

The ICEB size are modular and can be produced in a variety of shapes and types like – rectangular, curved with 'U' channels, in half, embodied decorative patterns etc. and its dimension and weight differs depending on the required sizes.

The ICEB can be produced with varying compressive strength depending on the load bearing requirements for the construction. The quality in terms of its strength and finishing is well controlled throughout the stages of its manufacturing process starting from selection of raw materials, mix ratio, compression loading and curing etc. and maintaining uniform size.

The cavity holes of the ICEB permits the introduction of vertical reinforcement embedded in the concrete without the shuttering job to make the building withstand earthquakes and heavy winds.

**The advantages of using Interlocking Cement Earth Blocks for the construction are given in the table below:**

Sl. No	Description	Advantages	Positive Effect
1	Interlocking system	<ul style="list-style-type: none"> <li>• Self-aligning</li> <li>• Reduce Mortar</li> <li>• Reduces reinforcement</li> <li>• Simplifies construction</li> <li>• Reduces need for skilled labour</li> </ul>	<ul style="list-style-type: none"> <li>• Minimum training</li> <li>• Max. use of unskilled labour</li> <li>• Reduces labour cost</li> <li>• Permits Self-help construction</li> </ul>
2	Modular	<ul style="list-style-type: none"> <li>• No need to cut</li> <li>• No materials wastage</li> <li>• Easily fits in place</li> <li>• Faster to build</li> </ul>	<ul style="list-style-type: none"> <li>• Materials saving</li> <li>• Labour saving</li> <li>• Shortens construction time</li> </ul>
3	Cement based	<ul style="list-style-type: none"> <li>• Strong and durable</li> </ul>	<ul style="list-style-type: none"> <li>• Resist fire, wind, flood and earthquake</li> </ul>

4	Load bearing walls	<ul style="list-style-type: none"> <li>Eliminates beams &amp; columns</li> <li>Eliminates form works</li> <li>Reduces reinforcement</li> </ul>	<ul style="list-style-type: none"> <li>Optimal use of materials</li> <li>Shortens construction time</li> <li>Cost reduction</li> </ul>
5	Use of local materials	<ul style="list-style-type: none"> <li>Easily available</li> </ul>	<ul style="list-style-type: none"> <li>Eliminates imported goods</li> </ul>
6	Light industry	<ul style="list-style-type: none"> <li>Quick and precise product</li> <li>Controlled production</li> <li>Controlled quality</li> </ul>	<ul style="list-style-type: none"> <li>Creates local employment</li> <li>Stimulates local employment</li> </ul>
7	Alternative to wood	<ul style="list-style-type: none"> <li>Minimize use in construction system</li> </ul>	<ul style="list-style-type: none"> <li>Reduce deforestation</li> <li>Better environment</li> </ul>
8	Environment	<ul style="list-style-type: none"> <li>No pollution</li> <li>No excavation</li> <li>Use mine waste</li> </ul>	<ul style="list-style-type: none"> <li>Environmental friendly</li> <li>Conserve ecology</li> </ul>
9	Energy	<ul style="list-style-type: none"> <li>Low embodied energy</li> <li>Could be used for eco-housing system</li> </ul>	<ul style="list-style-type: none"> <li>Energy efficient</li> <li>Eco-friendly</li> </ul>
10	Lightweight components	<ul style="list-style-type: none"> <li>Easy to put in place</li> <li>Heavy equipment not needed</li> </ul>	<ul style="list-style-type: none"> <li>Less capital investment</li> </ul>
11	Optimize strength	<ul style="list-style-type: none"> <li>Optimal use of material</li> <li>Reduce material quality</li> </ul>	<ul style="list-style-type: none"> <li>Cost reduction</li> </ul>

Druk Soednam Enterprise Interlocking Cement Earth Block has Quality Approval Certificate from Bhutan Standards Bureau.

#### 16) Eco-friendly initiative (A Bhutan Youth Development Fund (YDF) Social Enterprise)

The **'Egg tray manufacturing plant'** is a waste paper recycling project established by YDF as a conscious effort to reduce, reuse and recycle waste paper generated by the residents and offices of Thimphu. With the capacity to produce about 5000 egg trays, the plant recycles about a ton of waste paper produced every day.

The overall goal of the unit is to conserve and manage the rich biodiversity of Bhutan with the emphasis on solid waste management through the creation of employment to Bhutanese youth.

The income from the plant goes to sustaining drug education; prevention and rehabilitation services program of the YDF. Since its inception in 2005, the YDF has spent almost 4 million annually towards administrative cost of running the country's only drug and alcohol rehabilitation center in Serbithang. The income from the sale of the egg trays will cover almost half the administrative cost of running the center.

Further, the plant also offers reintegration and post treatment program to the clients of the center. The unit will also hire recovering addicts on an annual (rolling) basis to provide work experience and prepare them for reintegration into the society after completion of the treatment program.

This project also largely help contribution to the development philosophy of Gross National Happiness, in particular the two pillars such as;

- Equitable and equal socio-economic development and
- Conservation of the environment.

With the reintegration program of this plant, the clients from the rehab center will learn the entire process of operation and management of the plant. Skill such as, maintenance of basic books of accounts, customer care, marketing and other personal skills to build self-confidence, competencies, time management and team work will also be included within the program.





Beside reducing the import of the egg trays from India and creating employment opportunities for our youth, the plant will also help in sustaining drug-related program/activities by the income generated from the egg trays.

**Waste** is becoming one of the concern due to the rising rate of the population and rural-urban migration; inadequate public awareness and education on waste management issues; socio-economic activities such as a large number of constructions.

In particular, as Thimphu is the capital of Bhutan, it is facing such issues on a greater scale, adding more responsibilities to the Thimphu City Corporation (TCC).

Since waste papers are the key raw materials required for the egg tray production and on the other hand there is a large quality of papers waste generated from offices and schools, the project will start a Green Office Initiative to collect and transport waste papers to the project site/plant to recycle for making egg trays.

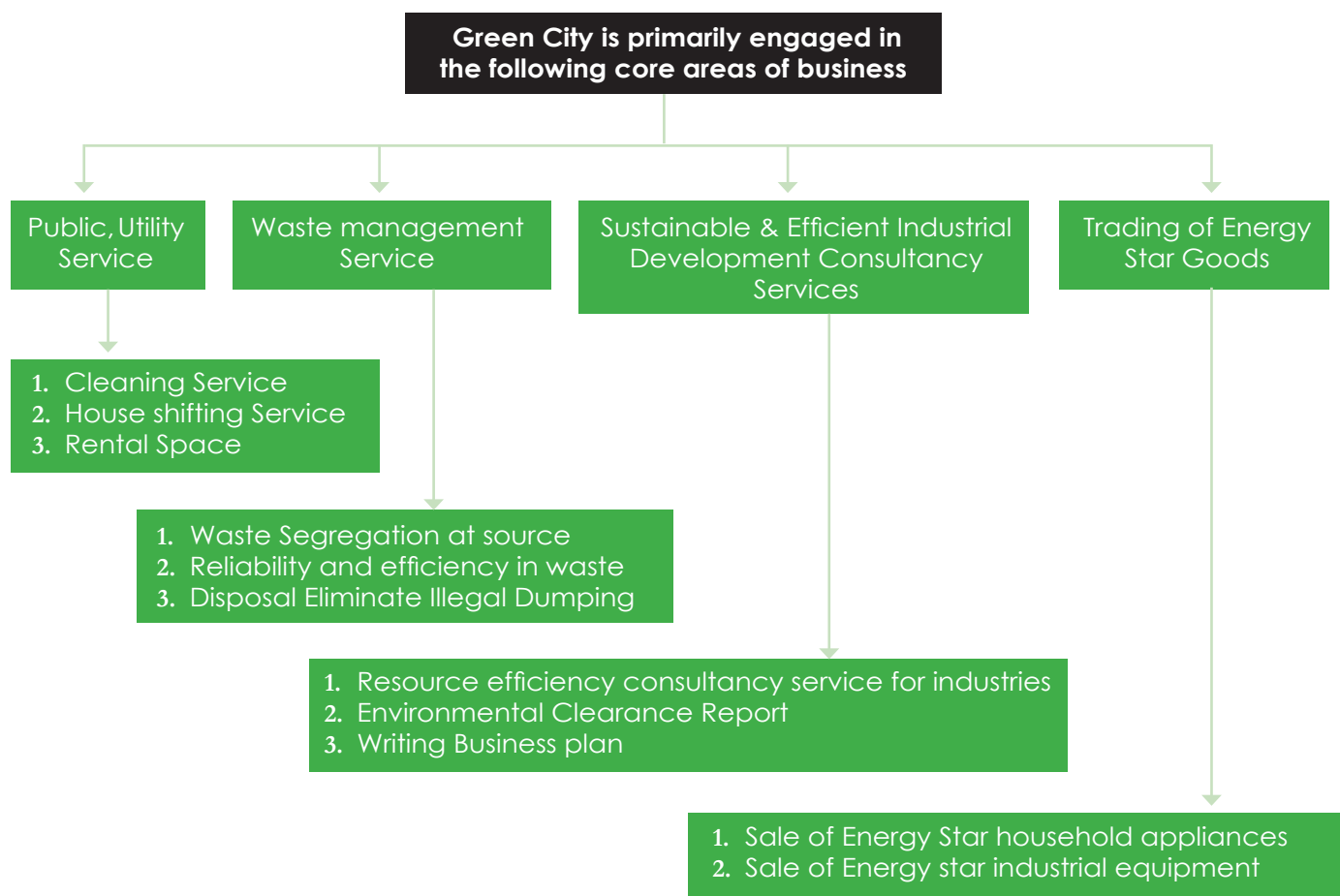
## 17) Green City Services

Green City Services is established by a group of young, passionate and committed entrepreneurs and their vision of a clean city which is sustainable and can play as a role model for future cities. As an agent of change, the entrepreneurs are trying to bridge the gap that exists between knowledge and practice on sustainable living. The unit aspires to provide the technical know-how and appropriate technology essential for sustainable development and bring inclusive growth, focusing on core areas of sustainability i.e. economical, environmentally and socially sustainable.

Green City Services is a licensed business with an array of services that is offered to the people of Thimphu city and beyond.



## Core Areas of Business



### Objectives of the unit:

- Live up to a GNH principles and image with practical approach in the field of 4Es i.e. Energy, Environment, Education and Events.
- Provide value for money services that are easily accessible, proactive in service delivery, consistent in quality, is efficient and builds on customer care and client trust.
- Creation of mass employment opportunity with focus in promoting blue collar job enhancing professionalism at work and provide moral security.
- Promote culture of entrepreneurship among youths in the country.
- Replicate the business model in the country and beyond.

Coordinate the efforts of different implementing agencies by organizing Green Events and provide platform for showcasing green efforts and its contribution in the country.

### 18) Mawongpa water solutions, machineries and equipment

MawongpaWater Solutions – It is a pioneer company which deals with machineries, equipment and cleaning services related to drinking water. The venture also assembles water purifiers and this arm of the service was started in 2009. Despite a humble beginning, today they have the know-how about

water problems and solutions. They have catered water tank cleaning service to more than thousand residences and have also supplied about twelve sets of industrial plants to hotels and industries and 50 sets of residential filters. Since surface water sources are mostly used for drinking water in Bhutan, this enterprise has offered valuable option to contain water-borne disease.

Mawongpa Water Solutions, Machineries and Equipment are established to:

1. Minimize Water Borne Diseases (also reduce medical expense on water borne diseases which is presently borne by the Royal Government of Bhutan)
2. Reduce usage of PET Bottles. (Also reduce import of PET bottles and environmental waste).
3. Reduce individual expense on packaged water.
4. Improve diary products.
5. Improve processed food and beverage quality.
6. Provide safe drinking water from water taps.

## 19) The Green Road

The Green Road is a new venture established recently. The unit recycles plastic wastes (shredded plastic) and uses it as a coating over aggregate for road construction. By this process, a road of 1 km length and 3.375M width of single lane can consume 1 ton of plastic (PET bottles, carry bags, covers, disposable cups, etc.) and the road strength is increased by 100 % and no potholes for ten years. The mix polymer coated aggregates have shown higher strength. Plastic waste in the use of road construction provides an opportunity to collect and dispose of plastic waste in the most environmental friendly way and it can be converted into a resource.

The durability of the roads laid out with shredded plastic waste is much more compared with roads with asphalt with the ordinary mix. Roads laid with plastic waste mix are found to be better than the conventional one. The binding property of the plastic makes the road lasts longer besides giving added strength to withstand more loads. While normal 'high quality' road last four to five years it is claimed that plastic bitumen roads can lasts up to 10 years. Rainwater will not seep as each km road with an average width requires 1 (one) tones of poly bend, using plastic will help reduce non-biodegradable waste.

To raise awareness to the general public, the green road aims to promote Integrated Solid Waste Management (ISWM) system based on 3R (reduce, reuse and recycle) principle. This covers all the waste systems and all the stages of waste management chain, viz, source, segregation, collection and transportation, treatment and material/energy recovery and final disposal. It has been shown that with appropriate segregation and recycling system, significant quantity of waste can be diverted from landfills and converted into resource.

The cost of plastic road construction will be lower compared to the conventional method.

### 1.1 objectives

The objectives of the Green Road are the following;

- To save the environment with all sorts of plastic waste.
- Build eco-friendly roads.
- To segregate all plastic waste from the landfills in the country.
- Cost saved for government.

- Import substitution of bitumen.
- To generate employments for the youth of the country.

**Comparison between ordinary Bituminous Roads and Waste Plastic Bituminous Roads:**

Sl.No	Properties	Plastic Roads	Ordinary Roads
1	Marshall Stability Value	More	Less
2	Binding Properties	Better	Good
3	Softening Point	Less	More
4	Penetration Value	More	Less
5	Tensile Strength	High	Less
6	Rutting	Less	More
7	Stripping (potholes)	No	Yes
8	Seepage of Water	No	Yes
9	Durability of Road	Better	Good
10	Cost of Pavement	Less	Normal
11	Maintenance Cost	Less	Normal
12	Environmental Friendly	Yes	No

20) NGN Technologies Pvt. Ltd.

The vision of the NGN Technologies Pvt. Ltd. is to be the center for Software Development Excellence. To be recognized regionally for providing the best business solutions using the latest e-technology and best-in-class people in the country. The mission of the company is to provide customers, IT enterprise/ products and end-to-end solutions with the essence of Time, Quality and Excellence so that customers get the best of experience from the company.

NGN Technologies Private Limited commits to provide new and latest technology and services that improve customers' work process, individual success and their organizational goal. They aim to become the centre for Bhutan's e-governance, e-commerce and e-business solutions for medium to large enterprises in the private and public sectors.

**NGN Technologies Pvt. Ltd.** is the pioneer systems integrator in Bhutan. With a pool of qualified Microsoft Certified Professional Systems Engineers (MCSE), D-Link Certified Engineers, CISCO Certified Network Associate (CCNA), APC Power Solution Engineers, Dell Servers and storage engineers, Oracle Sun Solaris Administrator and applying industries best practices, NGN Technologies Pvt. Ltd.

They provide end-to-end technology solutions:

1. LAN & WAN.,
2. NAS & SAN.,
3. Firewall & Network Security,
4. Data Centre Infra Structure. By deploying Schneider Electric IT Business products of which the enterprise is a partner, they build data centre (small to large), which is scalable and adaptable.
5. Video Conferencing, BOSCH Conference Systems, LG security cameras with remote surveillance,
6. Unify Communication PABX and IP telephony, Microsoft Business and Office Productivity suites & unified Communications.

7. Enadoc- Going paperless with efficient document imaging system. Enadoc is enterprise document imaging systems which can be hosted on-premise or in the Cloud and is mobile ready.
8. Xerox copiers, Multifunction Printers, solutions for large office shared printings, copying, scanning.
9. For banking solution. Diebold ATM, Electronic Fund Transfer Switch, ATM Reconciliation Solution.
10. Software Development on Java and Android platform.

### NGN Technologies Pvt. Ltd. Support Services

Post-sales support is a crucial component of NGN Technologies Pvt. Ltd. for all ICT equipment and systems integration deployed by us, an in-house developed computerized Warranty Tracking System logs customer's equipment serial number ID for instant information on the warranty status of the equipment enabling swift and efficient service action. Customer can log in to Repair Status to check online the status of repair by inserting the Job No. issued to them by our Technical Service Desk on receipt of their equipment for repair.

By arrangement with principal companies NGN Technologies Pvt. Ltd. provides local warranty, parts replacement and repairs to ensure ICT infrastructure down time is minimal with less loss on work productivity. This support is provided on-site for equipment and ICT infrastructure deployed within Thimphu, Phuentsholing and Gelephu and its adjoining dzongkhags. All other locations are serviced on a quarterly basis or carry-in to NGN Technologies Pvt. Ltd. Service Centres in Thimphu, Phuentsholing and Gelephu. The support can also be availed through on-line telephone, e-mail and remote management facility.

NGN Technologies Pvt. Ltd. deals in the following brands:

- *Dell*
- *OracleSun*
- *Schneider Electric IT Business*
- *Xerox*
- *Unify*
- *Diebold*
- *Microsoft*
- *Enadoc*

**E-Centric is another leap forward by the company.** E-Centric is NGN Technology's move into the e-world, hinged on the confidence garnered from its years of experience in the ICT business.

The company also provides **Repairs & Maintenance services**. This carry in service for repairs of computers, servers, notebook, printers, copiers and many more are carried out of our full facility Service Centers in Thimphu, Phuentsholing and in Gelephu.

### Employees

NGN Technologies Pvt. Ltd. employs over 56 highly motivated men and women instilled with the need to constantly improve delivery of products and services to its customers. All employees, irrespective of gender, are given equal opportunity for employment and upward mobility. Indeed, some of NGN Technologies Pvt. Ltd's star performers are women.

Although in Bhutan the most preferred choice of employment is with the civil service, more than 50% of NGN employees are university graduates or post graduates with management or technical degrees.

- They supply AC - chemical in AC are all eco-friendly
- All spare parts are recycled or sold back to OEM (Original Equipment manufacturer), all the AC and APC are also recycled.
- No waste as they sell their product directly to the purchasers (procurer) and if they have they also sell to the scrap dealers.
- Their products are all certified
- They sell the latest star-rated and energy-efficient products.

The company's main Market/Client are government, corporation and private sectors.

## 21) Samden Vehicles

The unit was established in 2008. The main customers of the unit are mostly contractors and government agencies.

### Employee:

The Samden Vehicle employs over 56 highly motivated men and women. 28 are employed in Thimphu head office and 28 in Phuentsholing. Out of 28, 10 are non-Bhutanese (Indian). The unit follows the labour laws of the country. Samden vehicle follows the rules and regulations set by MOLHR.

### Pollution and waste:

The water used by the unit is recycled water by German catcher machine, mobile, disposer pipeline system reload and dispose it. The company sells waste oil and other waste to dealers from border areas and also to local vendors.

Earlier, the unit use to supply Euro 1 and Euro 2 vehicles and now they are supplying Euro 3 vehicles which is known for its efficient and environment friendly engine, compared to Euro 1 and 2. Euro 3 vehicles are more fuel efficient compared to Euro1 and Euro 2. In Bhutan, most of the fuel is kept in barrel, increasing the chances of impurities in the fuel.

### Procurement Process:

They participated in government tender to supply school buses for the schools which they plan to do in the future as well.

- No complaints from procurers
- Tendering process is lengthy
- They are given 3-4 months to supply the vehicle after tendering. Delay from principal company, resending the vehicle beyond Delhi so unable to deliver on time.
- Sometimes government directly order from principal company without consulting the agent distributor in the country.

Tata Motors in India is equally focused on environment-friendly technologies in emissions and alternative fuels. It has developed electric and hybrid vehicles both for personal and public transportation. It has also been implementing several environment-friendly technologies in manufacturing processes, significantly enhancing resource conservation.

## 22) Lhaki General Store

The Lhaki General Store is located at heart of Thimphu city. Since its founding in Thimphu in 1976, Lhaki General Store has become leading supplier of hardware from various branded companies. Currently it deals with wide spectrum of products, including electrical items (Domestic, Commercial and industrial Applications), Building materials, Sanitary, Stationery and General Order Supply in Thimphu as well as in other twenty *dzongkhags*.

The enterprise has expertise in offering an extensive range of hardware products to customers. These industrial hardware products are manufactured following the set of industry norms and standards. Available in various specifications, the enterprise's brass hardware items are widely used in various commercial sectors. The offered products are appreciated by the customers for their durability, dimensional accuracy and sturdiness. Apart from this, their building hardware are thoroughly checked on various quality parameters before the final dispatch to the market.

Most of the products that the enterprise deals are ISO and ISI certified and approved by Bhutan Standards Bureau.

## 23) Garuda Inn

Garuda Inn is located at Chorten Lam, Thimphu. It was established in the year 2008.

The unit has food and catering, and bar services

The unit buys its vegetables, grocery and other hotel accessories like bed, mattress, bed sheets, pillowcase etc. from local markets.

The unit has 7 national employee who are all class 10 & 12 passed outs. They operate under the labour laws of the country.

All the raw materials for the unit like vegetables, grocery and variety of drinks are purchased from the local market.

The unit segregates its waste into bio-degradable and non-degradable waste. Most of the waste is disposed through the public waste collection provided by the municipality (*Thromde*). Waste like bottles and tins are sold to Greener Way for recycling.

## 24) Hotel Dhaensa, Thimphu, Bhutan

The unit is located at Druk Sherig Building in Thimphu town. The hotel offers affordable accommodation for travelers at reasonable rate. The core town is within a walking distance from the hotel where shopping centers, shops and handicraft shops are located in and around the hotel. Banking facilities are also available within 100 m from the hotel. The hotel is an ideal accommodation for business travelers and tourist.

### Waste:

They segregate the waste into bio-degradable and non-degradable waste. They collect PET bottles and give it to Greener Way .

### Employee:

The hotel has 9 national staff and they operate under the labour laws of the country. The hotel is inspected by BAFRA at regular intervals.

## Annexure 2. Meeting/consultation with stakeholders (Demand side)

As mentioned above (under methodology and approach) face-to-face meetings, discussions were carried out with relevant government officials. Further, communication through telephone, emails etc. were also carried out to collect relevant data and information to complete the tasks.

### Detail list of people met from various agencies

Persons Met	Agencies
Mr. Sonam Rinzin, Assistant Procurement Officer	Ministry of Work and Human Settlement
Mr. Karma, Director Mr. Tshering Wangdi, Chief Engineer Ms. Choden, Assistant Engineer	Department of Roads, Ministry of Work and Human Settlement
Mr. Tenzin, Director Mr. Tshering Dorji, Sr. Urban Designer & Architect	Department of Human Settlement, Ministry of Work and Human Settlement
Mr. Ugyen Dophu, Director General Mr. Ugyen Tashi, Officiating CPO Mr. Som Bdr Darjee, Sr. Program Officer	Ministry of Health
Mr. Chimmi Tshewang, Dy. Chief Procurement Officer Mr. Ngawang Norbu, APO, AFD Mr. Binod Sunwar, Sr. Planning Officer	Ministry of Education
Mr. Karma Sonam, Chief Engineer	School Planning and Building Division, Ministry of Education
Ms. Tshewang Zangmo	National Environment Commission
Mr. Kunzang Namgyal, Chief Engineer Mr. Jigme Tenzin, Electrical Engineer	Health Infrastructure Development Division, Ministry of Health
Mr. Rudra Mani Dhimal, Dy. Chief Accounts Officer Mr. Som Bahadur, Sr. Program Officer	Ministry of Health
Mr. Ugyen Tashi, Officiating Chief procurement Officer	Medical Supplies and Procurement Division, Ministry of Health
Ms. Dechen Zangmo, Officiating Chief Procurement Officer Mr. Kencho Dorji, Procurement Officer	Bio Medical Engineering Division, Ministry of Health
Mr. Ugyen Tashi, Officiating Chief Procurement Officer	Ministry of Health
Mr. Tenzin, Director Mr. Phub Rinzin, Chief Engineer. Mr. Karma Namgyel	Department of Engineering Services, Ministry of Work and Human Settlement
Mr. Tsheten Wangchuk, Accounts officer	Department of Public Accounts, Ministry of Finance

Apart from the list of people met above, BCCI has also met and consulted with GPP local partners as and when required.

### Annexure 3. List of FGD respondents

#### FGD with suppliers/private sectors for Green Goods, Services and Works.

Sl. No	Name	Company Name & Address
1	Mr. Tashi Wangdi, M.s T.D Construction	M/s. T.D. Construction Pvt. Ltd, Motithang
2	Ms. Thinley Dem	M/s. Passang Construction
3	Mr. Pema Tashi, Engineer	M/s. Progressive Research & Consultancy Services, Olakha
4	Mr. I.K. Chhetri	M/s. Himalayan Geology & Mining Services, Changangkha
5	Mr. Tshering Wangchuk	M/s. Gandhara Design
6	Mr. Sonam Tshering	M/s. United Consultancy
7	Mr. Sailesh Humagai.	M/s. United consultancy
8	Mr. Sangay Gyeltshen	M/s. Apecs Consultancy