



International Post-Master in Environmental Management ENVIM

Professional Thesis Abstracts



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Doctor Neuroinformatics

Stakes and challenges for recycling industrial waste: The example of Essilor prescription laboratories.

Essilor

Our current economic system, at the global level, is not sustainable. To reach sustainability, structural changes have to occur. Such changes include, but are not limited to, the recycling of material discarded from the economy, i.e. waste, in order to reduce the intensity of natural resource extraction. Essilor International, a French global company specialized in the manufacturing of ophthalmic lenses, intends to set up recycling streams for a variety of its industrial wastes. This study at Essilor involved the review, exploration, evaluation and setting up of waste recycling schemes for two types of waste generated at Essilor prescription laboratories that are not currently recycled: fusible metal alloy and plastic swarf.

Why is it important for a company to recycle waste: a macro-economic point of view is taken, focusing on the topic of natural resources management, more particularly materials extraction, and its link with economic activity. Recent trends on resource availability and price as well as future perspectives on their availability are provided. In order to prepare for likely upcoming scarcity, and thus increases and volatility in prices of natural resources, companies should focus on limiting their physical and financial dependence on newly extracted resources. This can be partly achieved through transforming generated waste into byproducts that can be sold, and with which new products can be manufactured.

The thesis describes the issues linked to the presence of indium, lead and cadmium for Essilor and the consequences of their presence for the issue of recycling. Financial, sanitary and environmental analyses are provided to evaluate the benefits of setting up a fusible metal alloy recycling stream. There is no simple existing solution to set up waste recovery schemes. The thesis concludes on the necessity, but insufficiency, of recycling for the economical system to reach sustainability.

Keywords: Essilor International, waste recycling, lens manufacturing, mining, resource, rare metals, plastic recycling

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Master's Degree International Affairs

Creation and implementation of a sustainable development strategy in the coconut-based organic substrate industry in Sri Lanka

Biogrow – Sri Lanka

Sustainable development in companies is “trendy” today. For a long time, sustainable development appeared as a mantra for ecology extremists, not taking into consideration the so-called priority objectives (e.g. sales growth, market development), and the constraints (e.g. cost control, competition) influencing the management of a company. In general, companies used to see sustainable development as a marketing tool and managers tended to consider it as an inefficient constraint in their day-to-day work. However, there was a shift in the comprehension of sustainable development. Successes involving sustainable development are being more and more common, and top managers tend to increasingly understand sustainable development as a means to increase the operational efficiency of an organization, to improve its management, and to promote positive impacts on stakeholders. Nevertheless, the world of sustainable development continues to lack a clear and shared understanding. The civil society, as well as companies, is still lost among the various terms, definitions and practices attached to sustainable development (e.g. corporate social responsibility, social responsibility, Environment Social and Governance, etc.).

The manufacturing of growing medium for greenhouse cultivation is booming today with the rising issues of disparities in access to food, increased food commodity prices, and challenges in future food production due to climate change. Hydroponic growers are looking for ways to produce their crops at a lower cost and with the minimal environmental, social and safety constraints. Biogrow Lanka provides tailor-made products for this

industry, using natural and organic solutions based on Sri Lanka's largest natural resources: coconut. BL is willing to implement a sustainable development strategy and related actions to promote its business and products, but also to improve its brand image in the frame of its penetration of the individual growers market. The individual growers market is more mature regarding sustainable development than the professional growers market.

This thesis has multiple objectives: to provide an introduction to the different terms and definitions attached to sustainable development; to present an application of a sustainable development approach on a company operating in a developing country; and to detail and propose actions led or to be implemented in the frame of a sustainable development strategy for the company.

This study will detail the methodology used to define BL new sustainable strategy, based on the different tools of sustainable development (e.g. United Nations Global Compact, ISO 26000, Global Reporting Initiative) and on a thorough risk analysis of BL activities. This risk analysis provided interesting findings regarding the company's priorities in terms of commitment and action. For example, considering the multiple gaps in BL management of health and safety and its exposure to legal and human capital risks in this regard, health and safety constitute one of BL main challenges. The basis of BL SD strategy is finally composed of 5 main areas of action: Environment, Employees, Suppliers & subcontractors, Customers, and Local communities. These areas of actions are then supported by commitments hold by BL CEO, objectives, indicators and an action plan. Without these instruments a strategy will neither be efficient nor lively. But processes and systems are not sufficient. Difficulties were encountered during the implementation of the actions due to the lack of maturity of the company's corporate culture to sustainable development, to the availability of managers to help develop projects during the busy season, and the lack of data and tools to conduct clear assessments of BL products' carbon footprint or LCA. It is a complete change in management that is proposed in this thesis, integrating sustainable development issues and components in the day-to-day organization, in the management, teamwork and decision-making process. A whole new corporate culture remains to be installed at BL, although the first seeds were planted during the mission conducted at BL. Great challenges are ahead of BL to enable the continuity of the strategy thanks to proposed tools and the management appears responsive to the initiative.

As regards the implementation of sustainable development, we should not consider that only processes and systems should be put in place. Changing the corporate culture is the best way to ensure the continuity and evolution of a sustainable development strategy.

Keywords: sustainable development, corporate social responsibility, HSE, cocopeat, substrate, corporate culture, environment, employees, suppliers, subcontractors, local communities, ISO 26000

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Methanisation on an international scale: How to develop an economically viable and geo-ecological solution for energy production?

Verdesis - France

The OECD Energy and agriculture consumption has known serious growth in the last century which made them think of renewable sources and less impacting the environment. Several technologies have been supported with different manners. In Europe, Methanisation is known to be a clean source of energy that can produce electricity and heat from organic wastes and treat these wastes to become fertilizers. In Europe this technique for producing energy has increased a lot the last 10 years, especially in Germany and northern countries. Thanks to subsidiary systems (feed in tariffs, certificates, financial participation, ...) it is progressively gaining importance in other countries like France and other countries of Europe but some aspects restrain the development and slow down its expansion. High capital required at investment stage and regulatory burdens are important barriers for its development.

This study firstly defines the technology functioning and the different input: dry or wet organic wastes that can come from industries or agriculture. Then, it also explains the different output possibilities: energy as heat and electricity, and digestate that can be used as a dry or wet fertilizer. In addition, it states its advantages regarding economy as it can foster a region by creating local jobs and producing stable energy. But it also states the advantage regarding environment as it could be used instead of fossil fuel and can produce quality

fertilizer. Secondly, this study concentrates on the accelerators and impediments of the expansion of methanisation by comparing France and Germany.

With less than 200 methanisation plants (at farm and industrial), France is far from the 6000 German's methanisation plants, because of the late consideration of this technology. Then, it analyses their different subsidiary systems and their past impacts on methanisation development. Financial and administrative helps and their flexibility are the main tools for government towards methanisation development. The Feed in Tariff appears as the most efficient support for development. In the third part, this information is linked with the innovation potential and the risks of the technology regarding gas usage and choices of inputs. Indeed, methanisation development has to be strictly supervised as it is a sensitive anaerobic digestion and a risky gas production. Lastly, this work helps to understand why methanisation could be advantageous for countries like China, with its energy and agriculture specificities, and how this sector could be developed further more at different step of projects developments.

Keywords: Methanisation, Renewable energy, Organic waste, Subsidiary system, Feed in tariffs

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How to use the information from monitoring network to change and enhance practices and users awareness and involvement in the field of water resources management? European Union experiences

OIEau – Sophia Antipolis

Among the pillars of Integrated Water Resource Management (IWRM), monitoring networks and public involvement are often mentioned themes because they allow the acquisition and transfer of knowledge. The acquisition of knowledge on the operation and status of water resources is essential to users and stakeholders to become aware of their aquatic environment "health." This knowledge allows establishing the situation and identifying appropriate measures to be implemented to rehabilitate and restore the original quality and functions of water bodies (WB). Public involvement itself is itself a necessary element to sustain the actions. Indeed, good policy tends to acceptance of its principles by users and citizens. It is only when it is appropriated that policy can be applied and that these principles provide the most effective results.

These fundamental issues have often been treated independently of one another in many books. Nevertheless, they were rarely crossed together to determine to what extent the results of one could nourish and improve the functioning of the other.

The main objective of this study is to achieve identifying good practices on the two themes we have brought to light. This objective is motivated by questionings that are currently taking place between the member states (MS) and the European Commission about the restitution of the information from the monitoring networks to the attention of the public, users and policy-makers.

There is a consensus today that the current method of assessing water quality is not sufficient. Indeed this method alone does not allow highlighting the efforts and improvements made since the entry into force of the WFD. The objective is to arrive in this context to identify the problem and respond or failing to generate actionable insights. To carry out this study, the first task was a literature review of the many documents that have been written on the subject of IWRM. This topic has been covered in its entirety by numerous documents that had interpreted by the yardstick of the WFD and the topics that concern us here. The WFD leads all member states to work on the theme of IWRM and particularly on monitoring networks and public participation. So we, during my internship, tried to learn more about the practices in different Member States through workshops and establishment of a platform for exchange. These information acquisition techniques have allowed us to make an overview of what was happening in Europe in this regard.

The scope of this study is mainly orientated to the EU context. Nevertheless, the main findings we have found could be summary in to two principles:

We can't judge/use what we don't know so we should find ways to:

- improve certainty in the acquisition of data
- be able to see more easily the impacts on the quality of Programme of Measures (PoM) WBs.
- present results that can translate the "return on investment" of PoM.

Once we have reliable and readable data, we should find the best ways to reach:

- policy makers, because they will validate and facilitate the implementation of PoM.
- stakeholders, because they have significant political weight but also a very strong impact on the quality of the resource.
- the public, to help them to take ownership of the PoM and qualities of WB in general.

Keywords: IWRM, monitoring programmes, community involvement, participation, indicators, tools

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Master's Degree Culture and Medias Management

Sludge drying in L'Oreal's Asian plants : an opportunity to reduce transportable waste Comparative study of sludge drying technologies

L'OREAL Shanghai

L'Oreal has decided in 2005 to reduce by 50%, by 2015, its emissions of CO₂ in absolute value, its consumption of water and its generation of transportable waste per unit produced. Two years before the deadline, the Direction of Operation in Asia, responsible for 6 plants in Asia, is on the good track to reach the objectives of water and CO₂ reduction. As far as transportable waste, a breakthrough needs to be accomplished.

Sludge represents on average 27% of the total transportable waste of the zone. As it is composed mostly of water, drying it would be an efficient way to reduce its volume. Apart from an abstract goal of reaching environmental KPI, drying sludge offers many environmental advantages : opportunity to valorize the dried bio solids (as alternative primary material in cement, as compost or fertilizer, as alternative fuel), less transportation needed, stabilized product, easier and safer disposal. Nevertheless, many sludge drying technologies present high energy requirements. So any technology offering a low energy balance would be encouraged, so as not to transfer the environmental impact of sludge from waste to CO₂. Each plant's situation as far as sludge is particular: according to the type of production, the volume and quality of the sludge is different. Factories producing hair care or skin care consume more water, and as a consequence generate more sludge, than factories producing dry products, such as make-up. So according to the factories, the sludge generated ranges from almost zero in Yichang to more than 700 Tons per year in Jababeka. In the coming years, as production will drastically increase, up to 20% per year, the factories might have to face increasing volumes of sludge to be disposed of, if nothing is done to address the issue.

Solutions for sludge drying have already been implemented in the different plants, some of them being pioneers in the cosmetic industry, like the CSTR and filtering gardens in Suzhou. But as these solutions are still in the commissioning phases, and as it cannot necessarily be transposed to other plants easily, other solutions have been studied : greenhouse drying, thermal processes (conductive and convective techniques), microwave drying, anaerobic digestion of the sludge. The choice of the solution for each plant depends on different factors: space available, climate, green electricity or waste source of heat available...

According to each of the plants' situation, first recommendations as far as choice of sludge drying technologies have been offered, and sludge drying projects have been launched in Indonesia and Suzhou. Keywords: sludge drying, thermal dryer, paddle dryer, belt dryer, greenhouse, filtering garden, microwave dryer, anaerobic digestion of sludge, thermal pre-treatment of sludge, CSTR, MBBR, DAF, heat recovery, energy recovery system, biosolids, sludge disposal

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Master's Degree International cooperation and development

Giving sense to CSR performance: the example of an electricity grid operator **RTE – Paris**

RTE is the French electricity transmission grid operator, and thus fulfils a crucial mission for the economic and social development of the country: it makes sure that energy production and energy demand match at every time, regardless of their respective fluctuations. This role is the core responsibility of the company, but not its only one: RTE is also expected to realize this mission in a sustainable manner, which means with care for its employees and for the environment and society it operates in. This vision of a broad responsibility for companies, apart from their productive role, is summed up in the concept of Corporate Social Responsibility (CSR). This application of sustainable development to companies includes a broad range of issues such as employees' working conditions, greenhouse gases emissions and economic impact of the supply chain. These issues are more and more associated with companies' responsibility, which are thus asked to regularly report on their performance in these domains. RTE has thus released in 2013 a CSR report to present a number of data and qualitative facts on these different themes, presented together with its financial results. This report, defined by a legal framework, gives a large overview of the company's impact, but does not allow to clearly identifying the key issues for RTE. This fact raises the research question of this work: what are the key responsibilities of RTE, and how is it integrated in its strategy?

The present study will propose an answer, relying on the developing concept on this question is the materiality analysis, which crosses stakeholders' expectations and business impact for each of the issues, in order to identify the most central and strategic ones. This analysis implied a measurement of stakeholders' expectations and business impact of a number of CSR issues, and its results are presented in part 2. These results define RTE's priorities in its CSR reporting. Hence, the results of this analysis define the most crucial CSR issues faced by RTE in its activities, and appear to be applicable to any similar company. Nevertheless, the nature of activities (here, transporting electricity at high voltage) does not generate the same responsibility depending on the economical and cultural context they take place in. Indeed, the Chinese counterpart of RTE (SGCC) fulfils a similar role but with a significantly different CSR strategy. Considering the core differences between RTE and SGCC will illustrate the importance of taking into account the nature of activities and of the territory and actors a company interacts with, while taking into account its responsibility, thus will give full sense to its CSR performance.

Keywords: electricity grid operator, CSR, energy transition, renewable energies, stakeholders, materiality analysis, reporting

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Measuring sustainable development in transport infrastructure projects: tool development and case application **EGIS La Réunion**

The need for new transport infrastructure grows with the increase of urban population and wear-off of existing infrastructure. They contribute to the economic development of countries and stimulate the economy at the local level. But they are also at the heart of local and global environmental problems, which have gradually imposed sustainable development at the center of concerns of each city in the world. The challenge of civil engineering is the use of methods for measuring the impacts of urban development on the three pillars of sustainable development: economic, social, environmental. The objective of this thesis conducted at EGIS, a French engineering company, is to develop a framework for measuring sustainable development of a project during both design, realization and operation of an infrastructure in order to: manage the impacts, choose best alternatives; provide support for decision-makers; communicate on the project.

The thesis proposes a framework based on the declination of the main principles of sustainable development into criteria for a comprehensive assessment. The four stages of the framework are presented: identification of key issues; definition of objectives; construction of indicators; design of an operational tool: the SD Tool. The application to a New Coastal Road project in Reunion Island first allowed developing a set of objectives and indicators from the identification of six specific key issues. The SD Tool has been validated by assessments of preliminary and design phases. It helped to highlight positive evolution of the overall impacts between these two dates.

Both an approach and an operational tool for measuring sustainable development in transport infrastructure projects in all phases of their life cycle have been developed. The application to a case study helped to define a list of about 30 operational indicators that can be adapted to other similar projects. Three natures of criteria

are defined: quantifiable, progress, statistical distribution, associated to three types of indicators standardization.

Keywords: sustainable development, transport infrastructure project, indicator, tool

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Response of the informal sector size to the E-waste (M&H) Rules, 2011 in India: An Environmental Kuznets' Curve **GIZ India**

With increasing consumption patterns, a result of economic development and improving lifestyles, electronic products have become an integral part of every household. However, the heightened consumption of electronic waste has also escalated the rate of its disposal. Hence, e-waste management is gradually becoming a major concern worldwide. Illegal transboundary movement of e-waste from developed nations to developing and underdeveloped nations has reduced significantly after the ratification of the Basel Convention. However, developing nations, like India, are now struggling to safely manage e-waste generated on their own lands. E-waste contains precious metals like silver, gold and copper etc., the business of which has given rise to a huge informal sector in India, which thrives on the extraction and trade of these elements. Although this e-waste is being recycled, practices employed by the informal sector managing the country's e-waste are hazardous to both, the environment and human health.

India has recently introduced an e-waste law (E-waste [M&H] Rules, 2011) which aims at formalizing this informal sector and hence reducing the pollution caused due to informal e-waste management. Nevertheless, the informal sector size in India will not immediately start to decrease following the e-waste law. On the contrary, the informal sector population and its activities will continue to grow, triggered by the legislation's stringent nature yet weak enforcement. This is analogous to the Environmental Kuznets' Curve where increasing development of countries sees increasing pollution.

A similar curve will be built by the informal sector size in response to the e-waste legislation in India. The thesis analyses factors that will build this curve and supports the hypothesis by 3 different methods: extrapolating EKC to the e-waste scenario in India, cross country comparison of countries that have e-waste laws and on the field interviews of stakeholders of the e-waste management chain. In order for the curve to have a minimum area i.e. for the time taken by the informal sector to formalize and e-waste legislation to be completely enforced, necessary policy and economic instruments need to be practiced by stakeholders in the e-waste management chain in India. The analysis of the issues building the curve lead the way for individual stakeholder recommendations and policy actions that need to be developed, introduced in the law and implemented at each segment of the curve. These recommendations when taken up alongside the E-waste (M&H) Rules, 2011, will reinforce the e-waste law and make informal sector formalization more effective and the e-waste management sector pollution and hazard free in India.

Key words - e-waste legislation, India, informal sector size, EKC

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Printed Circuit Boards in electronic equipment at its end-of-life: technology developments and management challenges **Tsinghua University**

Printed Circuit Board (PCB) is to electrical and electronic equipment (EEE) what the nervous system is to an animal: it plays a key role in coordinating the circulation of electric current within its parts, thus enabling the exchange of information and elaborated functions – in contrast with purely electrical equipment, e.g. a basic

hair-dryer. In direct relation with technological innovations, PCBs have become increasingly complex, capable of performing more elaborate functions, built on an increasingly broader range of materials substances: preferably low-cost and eventually harmless, but also hazardous, valuable, or both. That complexity makes PCBs one of the most challenging EEE fractions to recycle, once it has reached its end-of-life (EoL) and needs to be disposed of. The rationale is simple: maximizing the recovery of the valuable fractions while safely disposing of the hazardous ones, given technical feasibility and economic viability constraints – two key parameters closely linked to the context of disposal.

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Development of innovative technologies for energy savings in sustainable cities The example of Degrés Bleus® development and perspectives for Lyonnaise des Eaux

As a matter of fact, it appears necessary to develop clean energies in cities to relieve both the energy supply risk and the environmental one. Firstly, we identified the major challenges in cities regarding energy. There is one key challenge: the renewable energy prices, which prevent them to be competitive. Then, we focused on an example of clean energy in the European Union and how it can be developed within cities. This tends to confirm the efficiency of renewable technologies, but raise other questions: how to finance renewable technologies?

This lack of competitiveness has been taken into account by institutions; which elaborate strategies and financial tools to make renewable energies more attractive. But what would happen if the subsidies stop and the price of conventional energies crumble? This is why; finally, we studied deeply the energy market and the perspectives that could give a chance to renewable energies. The whole energy management should be transformed.

Keywords: renewable energy, sustainable city, energy management, institutional tools, energy price

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EIA systems: A comparative study and a review of recent developments of regulations and best practices TOTAL

Nowadays, Environmental Impact Assessment (EIA) is established in national legislations, development banks procedures, and industry practices. EIA is also well recognized by International Conventions for environmental protection. However, EIA systems vary greatly in procedures and practices among national legislation and extraction industry. This thesis reviews EIA legislation of ten legislations in the scope of four aspects included in EIA system: environmental baseline study, biodiversity and ecosystem services impacts, public participation and risk assessment. The thesis examines the relative strengths and weaknesses of the ten EIA legislations highlighted through a comparison study. Recommended measures to increase the effectiveness and existing best practices of EIA system are also identified. The results of the comparative study demonstrate that no EIA legislation is perfect despite an increase of EIA international standards and an active academic research on EIA performance. This thesis concludes with some suggestions for future EIA systems. In the scope of TOTAL aspirations, the main objectives of this study are to assist the Company with new regulations concerning EIA, highlight "gold" standards and good practices for the improvement of TOTAL environmental norms.

Keywords: comparative study, Environmental Impact Assessment (EIA), national and international regulations, IFC Performances Standards

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Industrial energy efficiency: Methodology for a new Business in the Food, Drink and Milk sectors ELVIA Engineering

The control of production and energy consumption is a high environmental priority commitment by governments. We have in France, and more widely in Europe, technical and technological means for a better energy management. This requires an optimal utilization of resources. The major challenge therefore lies in the way we consume energy. The struggle of economic and ecological therefore goes necessary through energy efficiency. This situation leads to a rapid growth of the consulting business for energy efficiency in order to tackle the different needs and regulations. That particularly affects the food, drink and milk industry since the rising energy costs but also environmental issues and regulations have raised it awareness about their energy consumption. But because of the important weight of the food industry in the market, the energy becomes a competitive challenge for them.

New opportunity rise from it for consulting services, but for a new player on the market, developing a business needs methodologies and tools in order to carry out the activity. The methodology lies essentially on the assessment of the market situation such as prospects and legal obligations but also clear procedures to be applied. Each company usually develop it owns procedure aiming for the most comprehensive study possible. It usually includes the development of forms, international protocol for measurement and verification for the determination of energy value to improve. Then the competitive advantage for any company would come from it value-added, the expertise to offer the best solution from the data and information collected of a given situation. That comes across through analysis tools such as the utilization of comparative analysis, pinch analysis or exegy analysis. But starting a business could be extremely challenging which need to assess the prospect including the stakeholders of the market, the competitors or the legal regulations.

Given the current situation and future prospect of food, drink and milk industry, the possibility of developing a new business is important and promising. Thanks to the rapid growth and evolution of new technology and new regulation, there is a need to adapt and improve a company's methodology for carrying out an energy efficiency study regularly.

Keywords: methodology, business, energy efficiency, FDM industry, consulting market

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Application and Development of Smart City in China – Wuhan Smart City as a Demonstration Case Tong Zhu, CECEP Liu He Talroad Environmental Technology Co.,Ltd

The increase of population and urbanization bring the enormous formidable challenges and disadvantages, such as traffic congestion, medical care, scarce water resources, environmental pollution, waste disposal, and rising energy usage. All these challenges force us to develop intelligent and smart approaches to create economically, socially and environmentally sustainable living world.

The authorities, governments and urban planners have already become aware of the necessity of the development of Smart City. The construction of Smart City is initiated by the developed countries who have already achieved the targets and goals. In 2013, in the 12th Five-Year Plan, the Ministry of Housing and Urban-Rural Development of the People's Republic of China (MOHURD) firstly released the list of pilot Smart Cities, and consequently local governments initiated the design and planning of the Smart City.

Firstly this thesis introduces the concept of Smart City and analyzes the two popular smartcity models. Afterwards the valuable smart experiences are illustrated by analyzing four famous smart cities. Along with the international smart city development, China realized the necessity of developing Smart City and started to develop the Smart City construction in large scale with an official release of 193 pilot Smart Cities and

formulate the up-to-date Smart City policy. Wuhan is selected as a demonstration case to discuss the Chinese Smart City development including the smart plans, objectives, smart projects as well as detailed implementation plans. By studying the specific smart case, it can be predicted the developing mode, the potential obstacles and challenges on the road to the completion of Smart City in China.

Keywords: Smart City, Urbanization, Internet of Things, Smart transportation,

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Smart solutions for energy efficiency in building, case study of Remote Energy Management System and Evaluation System developed by Schneider electric for Hotel industry Schneider Electric

Since 1980s, China has sustained rapid economic growth and thus become one of the world's largest energy consumers. Academy of Science released the Sustainable Development Strategy for China in 2009 concerning that China should drop 40%-60% of its national energy intensity per unit of GDP in 2020 compared to which in 2005. The Chinese government has noticed the energy insecurity in China and introduced policies to encourage enterprises to carry out energy-saving measures. Therefore, it's of great significance to carry out energy efficiency monitoring and evaluation activities, from which could discover the problems in the energy efficiency and point out the direction of energy saving. At the same time, it could also provide data support for the energy efficiency management department to evaluate energy saving achievement.

The building sector is responsible for more than 20 percent of energy consumption in China while in European this number is up to 40%, making building sector a very important sector in energy consumption (Lennart Jagemar, 2007). And in so many buildings public buildings are worth noticing. In china, currently there are about 500 million m² of large public buildings, whose energy consumption is 10 to 20 times higher than residential buildings. Therefore it's of great significance to control the energy consumption and improve energy efficiency in public buildings.

According to the functions of public buildings, they could divide into office, shopping malls, hotels, hospitals, schools etc. (杨秀与江亿, 2007). This paper will focus on energy efficiency of hotel industry. On the basis of the research on the management and evaluation of energy efficiency, firstly, the paper studied the technological process of hotel business, namely the field energy efficiency audit. Secondly, in order to provide continuous commissioning of the building, we will build an energy efficiency monitoring platform for this hotel building, collect and analysis the energy consumption of the users. Thirdly, according to the normative documents of china, formulating an energy efficiency assessment system for the hotel business; finally, through the case study of a specific hotel, analyze its load characteristics, introduce methods to assess the energy efficiency, propose the specific energy-saving program and analyze its cost-benefit.

In this paper, the monitoring platform, energy consumption benchmark and assessment methods for the energy efficiency is not only suitable for the hotel industry, but also can be extended to the other energy-consuming buildings, like the office buildings. Thus, the achievement of this paper will get a good prospect of application.

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Financial Leasing for the Development of China Energy Conservation Industry

As China industrialization and modernization process, energy challenges are increasingly prominent. During the 12th Five Year period, China will have to face high energy consumption, low energy efficiency, severe environment pollution, energy security and many other energy problems. Under such circumstance, we have

to make sustainable development strategy and promote the energy conservation industry. However, China energy conservation industry is at its initial stage and most energy conservation companies are small and medium-sized, who are facing great financing pressure.

As the diversification of China enterprise financing channels and transactions, energy conservation equipment financial leasing is emerging as a new financing way for energy conservation company. Financial leasing, as it separates the ownership and usage right of the equipment, adding many other unique advantages in financing and marketing, has become one of the most significant impetuses promoting China economy growth. Since small and medium-sized companies have little asset and low credit, they would have difficulties to raise money through loans, bonds and stocks. Financial leasing has relatively low access condition, fast procedure, tax benefit and other advantages, which enable small and medium-sized companies conduct equipment update and technology upgrade.

The thesis studied China energy situation and energy conservation industry; then introduced the basic theory, types and market of financial leasing; discussed the unique advantages and business modes of equipment leasing; compared different financial arrangements for energy conservation project through case study; and at last give recommendation for the future development of China energy equipment leasing.

Key words: energy conservation; financial leasing; small and medium-sized enterprise (SME)