

摘要

自工業革命以後，都市發展從傳統的步行方式、火車轉為以汽車為主，使全世界的能源消耗量快速成長，到了2005年，美國約86%的能源來自天然礦物燃料，多用在工業、運輸、住宅、商業四部份，而運輸和住宅的能源消耗量僅次於工業，消耗比例逐年上升。這樣無止境地竭取地球資源造成能源資源枯竭、全球暖化日趨嚴重、國際原油價格頻創新高，該如何降低能源消耗，提升能源的永續性為當前重要課題。

都市空間對能源使用影響中，交通和住宅兩種類型多次被用來測量環境永續性，多數研究皆強調交通對能源的影響，只有少部分針對住宅能源消耗量進行探討。但無論何種方向的研究，都揭露了能源消耗與都市空間特質和通勤模式有關，都市實質空間環境的型態直接或間接影響了住宅和通勤能源消耗，例如以較小的社區為基礎單位，藉由減少私人用車，採步行、腳踏車或大眾運輸方式減少能源消耗量，但台灣目前研究多著重在交通能源使用與都市空間結構的關係。基於臺北市北投區擁有較低的人口密度和多樣化土地使用分區，如國家公園、農地、住宅、商業等多樣土地使用模式之考量，本研究透過社區訪談與問卷調查結果為探討基礎，了解社區居民日常生活模式(如就學、就業、休閒和購物等)與活動空間分佈位置以計算能源消耗量，企圖建立具有節能效益之空間型態與策略，達到永續發展目標。

研究發現都市的密度、住宅特色和位置等空間特質，還有大眾運輸便捷度皆會對住宅能源消費產生影響：大坪數住宅與高人口數會增加家戶能源消耗；高人口密度與便利的大眾運輸明顯降低通勤能源消耗。一個永續的環境應將能源消費量降至最低，在小於都市層級的行政里階層中，考量基本元素如住宅特色、空間特質、交通運輸等，即能有效達到節能之效益，並由下而上建立緊密發展且多樣性的生活環境，並朝向可持續發展之目標前進。

關鍵字：節能效益、永續發展

Abstract

Since the Industrial revolution, urban development patterns have evolved from traditional walking, to transit, and to automobile dependent cities, and the consumption rate of worldwide energy has increased rapidly. In year 2005, statistics showed that 86 percents of our energy consumptions were extracted from the combustion of fossil fuel in the U.S., which has been used in industrial, transportation, residential, and commercial sectors. Among those, the amount of industrial and residential energy consumption together is the second largest and next to industrial usage. With this rising consumption rate every year consumed by human, the natural resource will result in energy shortage (exhausted energy resources), increasing global warming effect, and pushing oil price to the new peak. How to reduce our energy consumption rate through managing urban spatial patterns and to use energy efficiently for environmental sustainability has now become an important issue.

The impact of urban form on energy usage can be classified into two types: transportation and residential. Most researchers emphasized the impact of urban form on transportation energy usage. Only few concentrated on the impact on residential energy consumption. Whichever researchers choose the aspect for their studies, both aspects show that energy consumption is closely related to urban spatial configuration and commuting pattern. The interaction between density, mixing land use, and community spatial arrangement directly or indirectly affect human's energy usage. The strategies of providing walkable communities and encouraging public transportation usage are employed for example to reshape sustainable urban form. Based on the consideration of lower population density and diverse land uses including national park, residential, commercial, industrial, and agricultural lands, Beitou district is chosen for this study. Through interviewing and survey questionnaires for understanding household's daily activity locations and correlating the community spatial configuration with commuting time, this research aims to unveil the relationship between community spatial patterns with their energy usages and to define a sustainable way of building the community.

This study finds that urban spatial configuration, usage of public transit, and household characteristic are statistically correlated with community energy consumption efficiently. The larger the floor areas and the resident number, the lower the efficient of household electricity consumption. For transportation energy use, the more the private vehicles, the more the gasoline consumed. Also, higher population density and the closer distance to public transit station apparently are able to contribute to shorter trips. To achieve household sustainable development, the concept of urban village and the idea of compact development based on neighborhood scale are likely to promote efficiently energy consumption.

Keywords : Efficient Energy Consumption 、 Sustainable Development