

AESC Review Note 5

Household Energy Behavioural Studies

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Introduction:

The literature suggested that household energy behaviour is affected by a number of factors, which include subjective norm, energy knowledge, perceived energy-saving control and sense of responsibility. These factors would greatly affect the personal attitude and energy-saving behaviour. It thus provides a good reference for policymakers in formulating the energy-saving approaches. Some key findings of the literature are highlighted in Table 1.

Table 1. Highlights of the Key Findings of the Literature on Household Energy Behavioural Studies

Author	Title	Keywords	Main Findings
(Ben & Steemers, 2018)	Household archetypes and behavioural patterns in UK domestic energy use.	Domestic energy usage, Behavioural patterns, Energy policy	<ul style="list-style-type: none"> • This research aims to identify household archetypes and behavioural patterns to allow a targeted approach in energy-saving policy and retrofit improvement • Results show that (1) active spenders, (2) conscious occupiers, (3) average users, (4) conservers and (5) inactive users have specific energy behavioural pattern • This tailored approach provides a gateway to developing more effective low-energy policies for specific household
(Han & Cudjoe, 2020)	Determinants of energy-saving behaviour of urban residents: Evidence from Myanmar	Energy-saving awareness Energy-saving behaviours, Questionnaire Survey, Urban, Myanmar	<ul style="list-style-type: none"> • This paper investigates the determinants of urban residents' energy behaviour in Myanmar • Results show that (1) knowledge about energy issues, (2) degree of concern, (3) perceived energy-saving control and (4) sense of responsibility positively influences the energy-saving behaviour • This study makes a good reference for policymakers in formulating and implementing energy-saving policy
(Jareemit & Limmeechokchai, 2019)	Impact of homeowner's behaviours on residential energy consumption in Bangkok, Thailand	Household energy use, Energy-saving behaviour, Energy efficiency,	<ul style="list-style-type: none"> • This article investigates homeowners' energy-saving behaviour and their attitudes, which influence energy conservation in Bangkok

		Homeowner	<ul style="list-style-type: none"> ● Results show that gender and level of knowledge in energy efficiency are found to engage a significant impact on energy consumption
(Jianmin et al., 2020)	Questionnaire Survey System for Residential Customers based on Developed Consumption Behavior Model	residential customer, energy demand model, consumption behaviour model, the questionnaire survey system	<ul style="list-style-type: none"> ● This article utilizes the Engel-Kollat Blackwell consumption behaviour model to interpret the household energy behaviour ● Results found that customer behaviour is determined by (1) cognition and consciousness, (2) present habits of the appliance and (3) future demand for appliances
(Nie et al., 2019)	Exploring reasons behind careful-use, energy-saving behaviours in the residential sector based on the theory of planned behaviour	Energy-saving behaviour, Theory of planned behaviour, Structural equation modelling, China	<ul style="list-style-type: none"> ● This paper investigates the careful-use behaviours within the frameworks of the Theory of Planned Behaviour (TPB) ● Results show that subjective norm is the most important effect, which differs significantly from the previous study ● Therefore, widely implement the energy knowledge diffusion and energy information publicity are advisable
(Van Den Broek et al., 2019)	Drivers of energy-saving behaviour: The relative influence of intentional, normative, situational and habitual processes	Energy conservation, Psychological model Intentions, Social norms, Behavioural control	<ul style="list-style-type: none"> ● This study applies the Comprehensive Action Determination Model (CADM) to interpret the relative influence of (1) intentional, (2) normative, (3) situational and (4) habitual process on energy-saving behaviour ● Results show that situational and habitual process was the best able to account for energy-saving behaviour

(Yu et al., 2020)	Causal Effect of Time-Use Behavior on Residential Energy Consumption in China	Time-use behaviour, Activity structure, Energy consumption, Energy-saving potential	<ul style="list-style-type: none"> ● This paper investigates the causal effect from the initial generation of activity to the final energy consumption ● Results show that the increasing popularity of online activity and services would increase domestic energy consumption by nearly 20% <i>[also a useful reference for our Covid-19 paper]</i>
(Zhang et al., 2018)	Impact factors of household energy-saving behaviour: An empirical study of Shandong Province in China	Individual subjective factors, External influencing factors, Energy-saving intentions, Energy-saving behaviours	<ul style="list-style-type: none"> ● This study utilized the structural equation model to analyze the (1) individual subjective factors, (2) external influencing factors and (3) personal intention on shaping energy-saving behaviour ● Results found that values included in subjective factors and quality of energy-saving products included in external factors have the greatest effects on energy-saving behaviour

Nie, H., Vasseur, V., Fan, Y., & Xu, J. (2019). Exploring reasons behind careful-use, energy-saving behaviours in residential sector based on the theory of planned behaviour: Evidence from Changchun, China. *Journal of Cleaner Production*, 230, 29-37. doi:10.1016/j.jclepro.2019.05.101

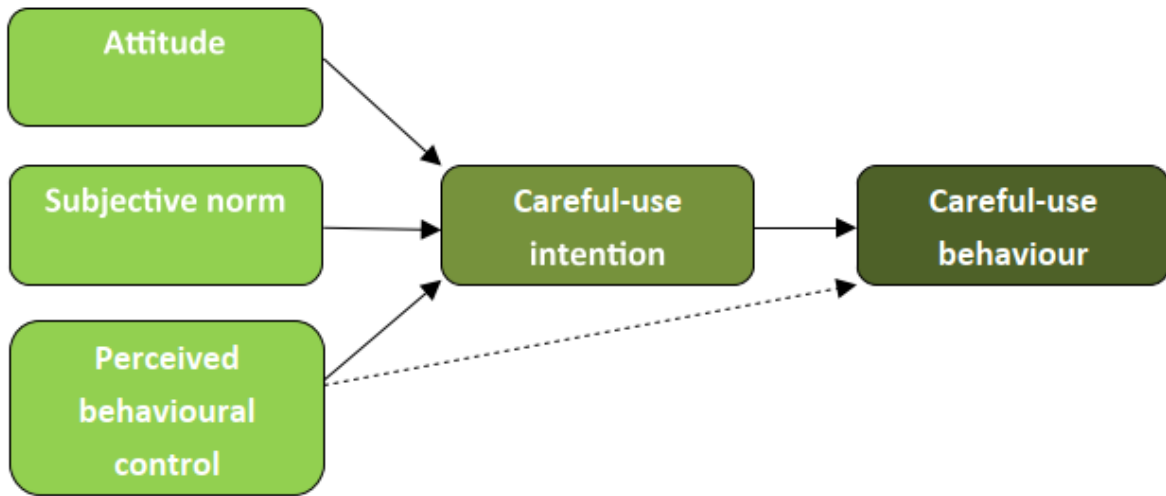


Fig. 2. Careful-use behaviour model, based on the Theory of Planned Behaviour (TPB).

Table 1
Description of constructs and items with corresponding statistical characteristics.

Constructs	Items	N	Mean	Std. deviation
Careful use behaviour	How often do you do the following behaviours?			
	Shutdown appliances instead of standby?(B1)	396	3.89	1.174
	Turn off lights in the empty room? (B2)	396	4.29	1.025
Careful use intension	Walk or cycle instead of driving in a short distance?(B3)	396	3.85	1.214
	Are you inclined to contribute to the following activities?			
	Saving energy by reducing unnecessary energy use at home (I1)	396	3.86	0.984
Attitude	Saving energy by reducing unnecessary energy use on the road (I2)	396	3.75	0.915
	To what extent do you agree with the following statements?			
	Humans' energy waste activity will lead to disastrous consequence.(A1)	396	4.21	0.991
Subjective norm	Significant energy savings could be achieved by careful use energy.(A2)	396	3.78	1.077
	Careful use behaviour is as important as energy-saving technology.(A3)	396	4.22	0.959
	To what extent do you agree with the following statement?			
Perceived behavioural control	When people care of careful use energy, I should do the same thing. (S1)	396	3.86	0.984
	My colleagues often conduct careful use behaviours. (S2)	396	3.66	1.020
	My families often conduct careful use behaviours. (S3)	396	3.96	0.923
	Do you feel any resistance to do the following activities?			
	Close the window when the heating works (P1)	396	4.00	1.035
	Walk in a short distance (P2)	396	3.86	1.027
	Turn off light in an empty room (P3)	396	4.08	1.046
	Shut down the TV instead of standby (P4)	396	4.01	1.040
	Cycle in a short distance (P5)	396	3.92	0.992

Yu, B., Yang, X., Zhao, Q., & Tan, J. (2020). Causal effect of time-use behavior on residential energy consumption in China. *Ecological Economics*, 175, 106706. doi:10.1016/j.ecolecon.2020.106706

Table 3
Classification of residents' daily activities.

First-tier activity	Secondary-tier activity	Activity description
SNA production activities	Paid work	Formal sector work, primary production activities for the household, manufacturing activities and construction activities, provision of services for income for the household, and travel related to SNA production activities
Non-SNA production activities	Food and drink management	Food or drink preparation, service, and cleanup
	Cleaning	Cleaning and upkeep of the dwelling and surroundings
	Shopping	Shopping for daily goods and durable goods and related travel
Learning activities	Family member care	Care of underage children and adults and related travel
	Learning and training	Formal and informal education, training, study/research for any course or class, and travel related to learning activities
Personal care and maintenance activities	Sleeping	Night sleep/essential sleep and incidental sleep/naps
	Eating and drinking	Eating meals/snack and drinking outside meals or snacks
Leisure activities	Personal hygiene and care	
	Mass media	Watching and listening to TV, videos, the radio, or other audio devices; reading books or periodicals; and surfing the internet for leisure
	Sports	Indoor and outdoor sports and related courses
Other activities	Hobbies, games, cultural and entertainment events	Playing card or board games, offline computer games, and social or group games; engaging in art activities; attending movies/cinema, theater, opera, ballet, concerts, parks/gardens, shows, and sports events; visiting museums, art galleries, historical/cultural parks, heritage sites, etc.; and travel related to these activities
	Socialization and communication	Socialization, community participation, and travel related to these activities
	Activities in addition to those listed above	

Note: The category of the activities is defined according to the international classification of activities for time-use statistics (ICATUS) published by United Nations.

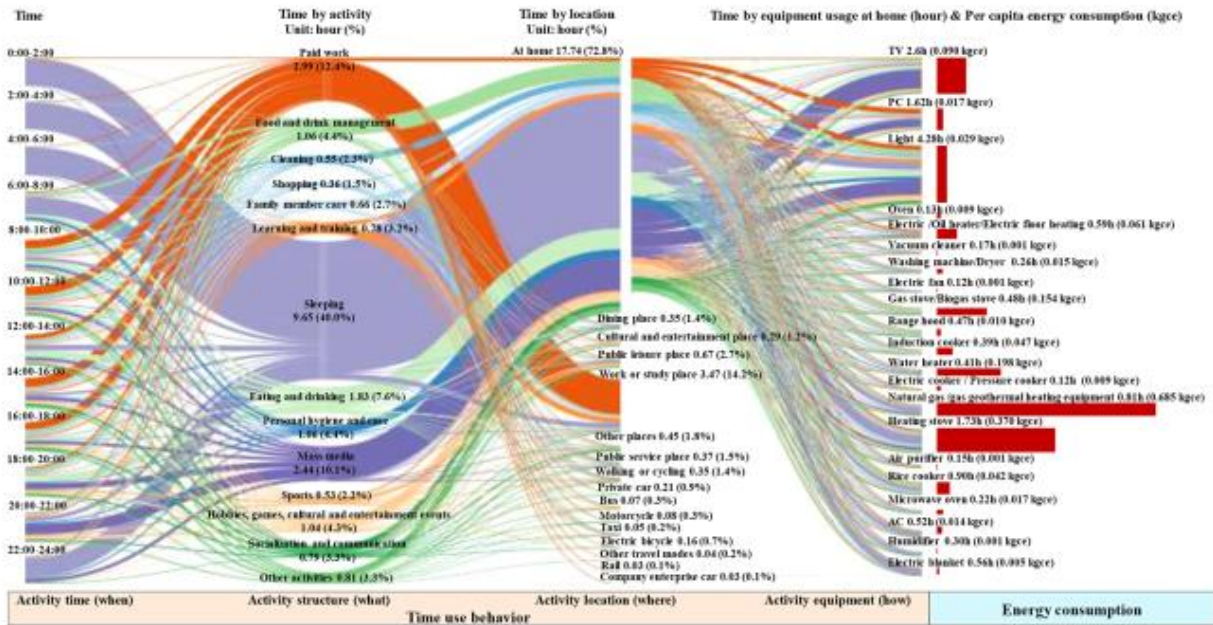


Fig. 2. Time-use behavior and residential energy consumption flow for an average Chinese resident.

Zhang, C.-Y., Yu, B., Wang, J.-W., & Wei, Y.-M. (2018). Impact factors of household energy-saving behavior: An empirical study of Shandong Province in China. *Journal of Cleaner Production*, 185, 285-298. doi:10.1016/j.jclepro.2018.02.303

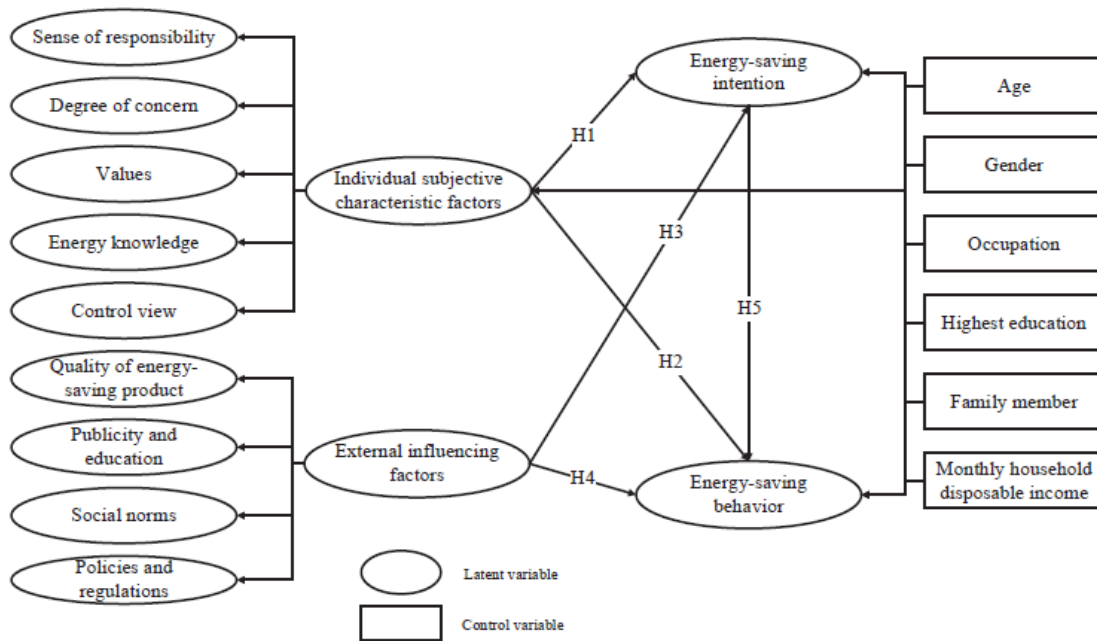


Fig. 2. Urban household energy consumption behavior model.

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