

The macroeconomic impact of the green building industry

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Abstract. In recent years, green building flourish in our country, but mainly in the technical aspects of the application and cost analysis, and for estimates of the macroeconomic impact of green buildings rarely, paper for qualitative analysis of this problem, use 2010 input-output table data on green buildings is estimated to give some policy recommendations based on measurement results.

1. Introduction

With the rapid development of China's economy and the acceleration of urbanization, Human activities on the earth's resources cause excessive consumption of global warming. Among the energy consumption, Transportation and industrial buildings are called the three "big consume". Therefore, the development of low-energy buildings for energy conservation plays a vital role. But now most of the green building study focused on technology applications and environmental benefits, The macro-benefit study on green building industry rarely, This paper uses 2010 input-output table values to measure the driving effect of the green building industry to other industries^[1].

2. Driving effect on the macroeconomy green building industry

2.1 After the driving effect.

After the driving effect is through direct consumption relationships and to measure the relationship completely consumed. Direct consumption coefficient calculation formula[2]:

$$a_{ij} = \frac{x_{ij}}{X_j} (i, j = 1, 2, \dots, n)$$

Complete consumption coefficient calculation formula:

$$B = (I - A)^{-1} - I$$

2.2 Forward driving effect.

Forward driving effect refers to the direct distribution relationships and to measure the relationship between the fully allocated. Direct allocation formula coefficient:

$$r_{ij} = \frac{x_{ij}}{X_i} (i, j = 1, 2, \dots, n)$$

Complete partition coefficient is calculated:

$$D = (I - R)^{-1} - I$$

2.3 Total driving effect.

Total driving effect is the sum of the driving effect and forward drive after effects.

3. Empirical Analysis

3.1 Direct consumption Relations

In 2010 Chinese input-output table for the analysis of the object, The same calculation method using the direct consumption coefficient Direct consumption coefficient can be calculated with the real estate industry sectors.[3]

| Industry Title | Direct consumption coefficient | Industry Title | Direct consumption coefficient | Industry Title | Direct consumption coefficient |
|--|--------------------------------|--|--------------------------------|---|--------------------------------|
| Financial Industry | 0.043165 | Wholesale and retail trade | 0.004301 | Textile Industry | 0.001121 |
| Leasing and Business Services | 0.034020 | Textile, leather Down and manufacturing | 0.004546 | Metal smelting and rolling processing industry | 0.000904 |
| Building industry | 0.019399 | Information transmission, computer services and software industry | 0.003928 | Public Management and Social Organization | 0.000667 |
| Chemical Industry | 0.016832 | GM, special equipment manufacturing industry | 0.003848 | Postal Services | 0.000644 |
| Accommodation and Catering Services | 0.016421 | Transportation Equipment Manufacturing | 0.003572 | Health, social security and Social Welfare sector | 0.000348 |
| Real Estate | 0.013261 | Communications equipment, computers and other electronic equipment manufacturing | 0.003021 | Non-metallic mineral products industry | 0.000299 |
| Petroleum processing, coking and Nuclear Fuel | 0.013170 | Communications equipment, computers and electronic equipment manufacturing | 0.002832 | Education | 0.000238 |
| Transportation and warehousing | 0.007607 | Instrumentation and cultural officeMachinery manufacturing | 0.001970 | Coal Mining and Dressing | 0.000214 |
| Resident Services and Other Services | 0.007416 | Integrated Technical Services | 0.001932 | Research and experimental development industry | 0.000212 |
| Water conservancy, environment and public facilities Management Industry | 0.006324 | Crafts and other manufacturing industries (including scrap waste) | 0.001302 | Water production and supply industry | 0.000184 |
| Fabricated Metal Products | 0.006117 | Wood processing and furniture manufacturing | 0.001219 | Gas Production and Supply | 0.000106 |
| Electricity, heat production and Supply | 0.006034 | Electrical, machinery and equipment manufacturing | 0.001180 | Agriculture, forestry, animal husbandry and fishery | 0.000083 |
| Paper printing and Educational and Sports with Product manufacturing | 0.005910 | | | Oil and gas industry | 0 |
| Culture, Sports and Entertainment | 0.005326 | | | Metal mining industry | 0 |
| | | | | Non-metallic minerals and other mining industry | 0 |

3.2 Completely consumed relationship

Similarly, in the analysis of the four sectors of the total consumption coefficient, We are 41 departments to do further analysis. In 2010 Chinese input-output table (41 sectors) for the analysis of the object, Calculated using complete consumption coefficient.

| Industry Title | Total consumption coefficient | Industry Title | Total consumption coefficient | Industry Title | Total consumption coefficient |
|--|-------------------------------|--|-------------------------------|--|-------------------------------|
| Chemical Industry | 0.078152 | Communications equipment, computers and other electronic equipment manufacturing | 0.021882 | Culture, Sports and Entertainment | 0.007161 |
| Agriculture, forestry, animal husbandry and fishery | 0.073324 | Building industry | 0.020878 | Instrumentation and cultural office machinery manufacturing | 0.006182 |
| Financial Industry | 0.062683 | Real Estate | 0.018806 | Wood processing and furniture manufacturing | 0.005908 |
| Leasing and Business Services | 0.047163 | Wholesale and retail trade | 0.017625 | Integrated Technical Services | 0.005770 |
| Metal smelting and rolling processing industry | 0.039592 | Fabricated Metal Products | 0.017588 | Non-metallic Minerals and Other Ore Mining industry | 0.002655 |
| Electricity, heat production and Supply | 0.036484 | Transportation Equipment Manufacturing | 0.017565 | Postal Services | 0.001563 |
| Petroleum processing, coking and nuclear fuel Material processing industry | 0.035154 | Coal Mining and Dressing | 0.015961 | Research and experimental development industry | 0.001425 |
| Transportation and warehousing | 0.031955 | Non-metallic mineral products industry | 0.012133 | Water conservancy, environment and public facilities Management Industry | 0.001424 |
| Food manufacturing and tobacco processing industry | 0.031112 | Resident Services and Other Services | 0.011617 | Gas Production and Supply | 0.001022 |
| Accommodation and Catering Services | 0.027220 | Textile Industry | 0.011539 | Health, social security and social Welfare sector | 0.000975 |
| Electrical, machinery and equipment manufacturing | 0.025437 | Metal mining industry | 0.009455 | Public Management and Social Organization | 0.000835 |
| GM, special equipment manufacturing industry | 0.024015 | Textile, leather Down and manufacturing | 0.009325 | Water production and supply industry | 0.000749 |
| Paper printing and Educational and Sports manufacturing | 0.023533 | Information transmission, computer services and software industry | 0.009241 | Education | 0.000574 |
| Oil and gas industry | 0.022384 | Crafts and other manufacturing industries (including scrap waste) | 0.007900 | | |

3.3 direct distribution relationship

In 2010 Chinese input-output tables for the analysis of the object, Using the same calculation method of direct distribution coefficients, Direct distribution coefficient can be calculated with the real estate industry sectors.

| Industry Title | Direct distribution coefficient | Industry Title | Direct distribution coefficient | Industry Title | Direct distribution coefficient |
|---|---------------------------------|---|---------------------------------|--|---------------------------------|
| Financial Industry | 0.034313 | Food manufacturing and tobacco processing industry | 0.003858 | Health, social security and social Welfare sector | 0.001024 |
| Wholesale and retail trade | 0.030010 | Education | 0.003541 | Coal Mining and Dressing | 0.000809 |
| Information transmission, computer services and software industry | 0.014676 | Fabricated Metal Products | 0.003271 | Metal smelting and rolling processing industry | 0.000681 |
| Real Estate | 0.013261 | Integrated Technical Services | 0.003060 | Postal Services | 0.000643 |
| Leasing and Business Services | 0.011933 | Paper printing and Educational and Sports Product manufacturing | 0.003020 | Electricity, heat production and Supply | 0.000609 |
| Accommodation and Catering Services | 0.007776 | Non-metallic mineral products industry | 0.002956 | Agriculture, forestry, animal husbandry and fishery | 0.000496 |
| Transportation and warehousing | 0.007594 | Textile Industry | 0.002797 | Research and experimental development industry | 0.000480 |
| Resident Services and Other Services | 0.007416 | Transportation Equipment Manufacturing | 0.002517 | Water conservancy, environment and public facilities Management Industry | 0.000452 |
| Textile, leather Down and manufacturing | 0.007248 | Wood processing and furniture manufacturing | 0.002200 | Water production and supply industry | 0.000304 |
| Chemical Industry | 0.006528 | Crafts and other manufacturing industries (including scrap waste) | 0.002130 | Metal mining industry | 0.000205 |
| GM, special equipment manufacturing industry | 0.006095 | Culture, Sports and Entertainment | 0.002104 | Non-metallic minerals and other mining industry | 0.000210 |
| Communications equipment, computers electronic equipment | 0.004542 | Building industry | 0.001978 | Oil and gas industry | 0.000161 |
| Public Management and Social Organization | 0.004316 | Instrumentation and cultural Office Machinery | 0.001034 | Petroleum processing, coking and Nuclear Fuel | 0.000155 |
| Electrical, machinery and equipment manufacturing | 0.004211 | | | Gas Production and Supply | 0.000078 |

3.4 fully allocated relationship

In 2010 Chinese input-output tables for the analysis of the object, The same calculation method using complete partition coefficient, You can calculate the exact distribution coefficient of real estate and various industrial sectors.

| Industry Title | Complete partition coefficient | Industry Title | Complete partition coefficient | Industry Title | Complete partition coefficient |
|--|--------------------------------|---|--------------------------------|--|--------------------------------|
| Leasing and Business Services | 0.064414 | Fabricated Metal Products | 0.020898 | Communications equipment, computers and electronic equipment | 0.011408 |
| Financial Industry | 0.057406 | Transportation and warehousing | 0.018758 | Wood processing and furniture manufacturing | 0.011405 |
| Oil and gas industry | 0.055552 | Real Estate | 0.018625 | Food manufacturing and tobacco processing industry | 0.010817 |
| Culture, Sports and Entertainment | 0.043258 | Integrated Technical Services | 0.017510 | Agriculture, forestry, animal husbandry and fishery | 0.010443 |
| Accommodation and Catering Services | 0.037146 | Crafts and other manufacturing industries (including scrap waste) | 0.016720 | GM, special equipment manufacturing industry | 0.010369 |
| Postal Services | 0.036052 | Electrical, machinery and equipment manufacturing | 0.016364 | Textile Industry | 0.010367 |
| Petroleum processing, coking and nuclear fuel Material processing industry | 0.034017 | Information transmission, computer services and software industry | 0.015908 | Water conservancy, environment and public facilities Management Industry | 0.008816 |
| Paper printing and Educational and Sports manufacturing | 0.033127 | Metal smelting and rolling processing industry | 0.014045 | Non-metallic mineral products industry | 0.008815 |
| Resident Services and Other Services | 0.028586 | Non-metallic Minerals and Other Ore Mining industry | 0.013511 | Transportation Equipment Manufacturing | 0.008628 |
| Instrumentation and cultural office machinery manufacturing | 0.025279 | Research and experimental development industry | 0.012470 | Building industry | 0.006128 |
| Metal mining industry | 0.024033 | Water production and supply industry | 0.01238 | Health, social security and social Welfare sector | 0.001657 |
| Electricity, heat production and Supply | 0.023653 | Gas Production and Supply | 0.012257 | Education | 0.001013 |
| Chemical Industry | 0.022631 | Wholesale and retail trade | 0.011429 | Public Management and Social Organization | 0.000975 |
| Coal Mining and Dressing | 0.022544 | Textile, leather Down and manufacturing | 0.011409 | | |

3.5 Total driving effect: The sum of After and forward driving effect

| Industry Title | Total consumption coefficient | Industry Title | Total consumption coefficient | Industry Title | Total consumption coefficient |
|--|-------------------------------|--|-------------------------------|--|-------------------------------|
| Chemical Industry | 0.078152 | Communications equipment, computers and other electronic equipment manufacturing | 0.021882 | Culture, Sports and Entertainment | 0.007161 |
| Agriculture, forestry, animal husbandry and fishery | 0.073324 | Building industry | 0.020878 | Instrumentation and cultural office machinery manufacturing | 0.006182 |
| Financial Industry | 0.062683 | Real Estate | 0.018806 | Wood processing and furniture manufacturing | 0.005908 |
| Leasing and Business Services | 0.047163 | Wholesale and retail trade | 0.017625 | Integrated Technical Services | 0.005770 |
| Metal smelting and rolling processing industry | 0.039592 | Fabricated Metal Products | 0.017588 | Non-metallic Minerals and Other Ore Mining industry | 0.002655 |
| Electricity, heat production and Supply | 0.036484 | Transportation Equipment Manufacturing | 0.017565 | Postal Services | 0.001563 |
| Petroleum processing, coking and nuclear fuel Material processing industry | 0.035154 | Coal Mining and Dressing | 0.015961 | Research and experimental development industry | 0.001425 |
| Transportation and warehousing | 0.031955 | Non-metallic mineral products industry | 0.012133 | Water conservancy, environment and public facilities Management Industry | 0.001424 |
| Food manufacturing and tobacco processing industry | 0.031112 | Resident Services and Other Services | 0.011617 | Gas Production and Supply | 0.001022 |
| Accommodation and Catering Services | 0.027220 | Textile Industry | 0.011539 | Health, social security and social Welfare sector | 0.000975 |
| Electrical, machinery and equipment manufacturing | 0.025437 | Metal mining industry | 0.009455 | Public Management and Social Organization | 0.000835 |
| GM, special equipment manufacturing industry | 0.024015 | Textile, leather Down and manufacturing | 0.009325 | Water production and supply industry | 0.000749 |
| Paper printing and Educational and Sports manufacturing | 0.023533 | Information transmission, computer services and software industry | 0.009241 | Education | 0.000574 |
| Oil and gas industry | 0.022384 | Crafts and other manufacturing industries (including scrap waste) | 0.007900 | | |

Calculation 2010 input-output table based on results, Green building in China's real estate industry for each additional unit of output on a total driving effect is 1.616712 for each industry. That green building construction in order to improve energy efficiency and reduce emissions into the incremental cost per 1 million, will be the economic value of the various industrial sectors in the entire economy.

4. Suggestions

4.1 Increase government investment.

Governments should actively promote and advocate in the country's implementation of green building, green building industry financial subsidies. For the application of green building materials, the government should support the development of new energy-saving building materials, technology, technology[4].

4.2 Establish a sound legal system.

Although China has issued a corresponding policy of green building, but still far from perfect, To make green building a virtuous circle in the direction of healthy development, it is necessary to improve the legal system, And to combine my aunt actual situation gradually improved.

4.3 Strengthen publicity and education.

In China, most people think of green building just unrealistic slogans, Not really implemented. To change this situation, we must strengthen publicity and education, so that people pay attention to green building for a major role in energy conservation will be incorporated into the work of the center of gravity.

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