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Procedia

Energy Procedia 105 (2017) 327 - 334

### The 8<sup>th</sup> International Conference on Applied Energy – ICAE2016

## The Synergy Mechanism of Promoting Renewable Energy Consumption in China

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#### Abstract

With the improvement of environmental requirements, promoting renewable energy consumption has become a key. From the energy policy coordination point, this paper defined the concept of energy policy, and took price policy as center to design the synergy mechanism of carbon emissions trading, carbon tax, subsidy policy, price policy based on principles of departments collaboration, market dominant and orderly progress. The mechanism will make environmental benefits internalization of renewable energy, and gradually straighten out the energy prices mechanism, and provide a reference for setting renewable energy consumptive policy.

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Keywords: Renewable energy; Carbon emissions trading; Carbon tax; Subsidy policy; Price policy; Synergy mechanism

#### 1. Overview

With the rapid development of economy, China's energy demand continues to increase and environmental pollution is more and more serious. In order to relieve environmental pressure, promoting renewable energy development has no time to delay, and energy policy is closely related to energy development [1-3]. In recent years, the research on energy policy mainly concentrated in a single policy research [4-7], and various types of energy policies are different from departments and implementation objectives. Therefore, it is lack of synergy among energy policies. With the development needs of renewable energy, the synergy mechanism of energy policy has become urgent demand.

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Peer-review under responsibility of the scientific committee of the 8th International Conference on Applied Energy. doi:10.1016/j.egypro.2017.03.322

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Nomenclature	
<i>R</i> remaining of the whole society	C remaining of consumer
<i>S</i> remaining of producer	<i>0</i> remaining of society
<i>G</i> remaining of government	$P_1^*$ equilibrium price of coal
$P_2^*$ equilibrium price of oil	$P_3^*$ equilibrium price of natural gas
$P_4^*$ equilibrium price of thermal power	$P_{5,t}^{*}$ equilibrium price of renewable energy
$T^*$ equilibrium carbon tax rate	$P_{\rm r}^{\ast}$ equilibrium carbon price of carbon emission trading
$B^*$ equilibrium unit subsidy	$C_{na}$ CO <sub>2</sub> emissions cost of n-th energy
$E_{n}$ the total CO <sub>2</sub> emissions of n-th energy	<i>T</i> carbon tax rate
$\eta_{\rm n}$ carbon content ratio of n-th energy	$P_{\rm r}~$ carbon price of carbon emission trading
$i = \{1, 2, 3, 4, 5\}$ ; 1 coal; 2 oil; 3	natural gas; 4 thermal power; 5 renewable energy
$B_2$ unit renewable energy subsidy excess CCEF	$a_{CO_2}$ unit governance cost
$q_{_{\rm CO_2}}$ unit renewable energy CO <sub>2</sub> emission reduction compared with fossil energy	
$B_{\circ}$ unit renewable energy subsidy of pollutant r	reduction except CO <sub>2</sub>
$B_{\circ}$ unit renewable energy subsidy of pollutant r $P_{\rm e}$ desulfurization, denitration and dust of coal-	reduction except CO <sub>2</sub>
$B_{\rm o}$ unit renewable energy subsidy of pollutant r $P_{\rm e}$ desulfurization, denitration and dust of coal- $P_{\rm b}$ thermal power benchmark price	reduction except $CO_2$ fired power price $Q_n$ consumption of n-th energy
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$\begin{array}{l} B_{\rm o} & {\rm unit\ renewable\ energy\ subsidy\ of\ pollutant\ r} \\ P_{\rm e} & {\rm desulfurization,\ denitration\ and\ dust\ of\ coal-} \\ P_{\rm b} & {\rm thermal\ power\ benchmark\ price} \\ P_{\rm n} & {\rm price\ of\ n-th\ energy}  d  {\rm influence\ coeffic} \\ U_{\rm n} & {\rm heat\ value\ of\ n-th\ energy} \\ C_{\rm nf} & {\rm fix\ cost\ of\ n-th\ energy} \\ \theta_{\rm l} & {\rm CO_2\ emission\ of\ unit\ coal} \end{array}$	reduction except CO <sub>2</sub> effired power price $Q_n$ consumption of n-th energy icient of customer demands price compared with its rival $\pi_n$ profit of n-th energy $C_{nv}$ variable cost of n-th energy $\theta_2$ CO <sub>2</sub> emission of unit oil
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