

Appendix 2: Overview and classification of energy technology innovation policies and institutions in the BRIMCS countries

The appendix provides an overview and classification of energy technology innovation policies (ETIPs) and institutions (ETIIs) in six emerging economies; Brazil, Russia, India, Mexico, China and South Africa (which will be referred to as BRIMCS countries from this point onwards). The overview forms the basis for the comparative frameworks that have been used to identify opportunities for cooperation and coordination among the BRIMCS countries. The overviews only include ETIPs and ETIIs that are institutionalized at a national level and that were in place and active in 2009. Following the method developed by Kempener & Anadon (in preparation), the ETIPs and ETIIs are classified according to the technologies, stages, actors and functions that they target or impact. Five main databases have been used to collect information: (1) the WRI SP-PAMs Database (2010), (2) the REN21 Renewables Interactive Map (2010), (3) the IEA Global Renewable Energy Database (2010d), (4) the IEA Energy Efficiency Database (2010c) and (5) the IEA Addressing Climate Change Database (2010a). However, these databases mainly contain policies focused on renewable energy technologies and are poorly maintained. Therefore, these databases are augmented with the Clean Coal Projects database of the IEA Clean Coal Center (IEA 2010b) and the World Nuclear Association's country briefings (World Nuclear Association 2010)¹. Subsequently, these databases are cross-referenced with secondary literature, academic papers and national policy reports.

The overview and classification of ETIPs and ETIIs presented in this appendix are by no means complete or exhaustive. Furthermore, the classification of ETIPs and ETIIs is based on basic descriptions of these policies provided in the reference documents, which could mean that some elements of these policies are missing or incorrectly represented. In any way, the classification is a first start to provide a more systematic approach in comparing different countries.

This appendix consists of two parts. The first part provides an overview and classification of ETIPs and ETIIs in each country (including the references to the data sources). The second part provides the comparative frameworks that have been developed on the basis of these classifications.

2.1. Overview and classification of ETIPs and ETIIs in the BRIMCS countries

This section provides an overview and classification of ETIPs and ETIIs in each of the BRIMCS countries individually. The overviews provide the name of the policy or institution, a brief description and their start- and end-dates. Subsequently, the ETIPs and ETIIs are categorized according to the technology that they impact, the stage and actor that they target and the functions that they support. This classification is based on the comparative framework developed by Kempener & Anadon (in preparation). Table 1 provides an overview of the abbreviations that have been used to classify the ETIPs and ETIIs in each of their respective categories. The main data sources for the ETIPs and ETIIs are provided in the description

¹ In the overview tables, the five databases that have been used are referred to as WRI, REN21, IEA RE, IEA EE and IEA CC. The IEA Clean Coal Center database is referred to as IEA CCC and the country briefings of the World Nuclear Association is referred to as WNA.

of the policies. Additional references are derived from the following sources: (Chang, Leung et al. 2003; Goldemberg, Coelho et al. 2004; Huacuz 2005; Sousa Jr. 2005; Huacuz and Medrano 2007; APERC 2008; Joy 2008; Klimenko 2008; SANERI 2008; Shackley and Verma 2008; de Carvalho and Sauer 2009; Dino and Gallo 2009; Hira and de Oliveira 2009; Leite 2009; Liu 2009; Makarov 2009; REN21 2009; Rodrigues and Accarini 2009; Santalo 2009; Shmatko 2009; Tong 2009; Yang 2009; Bo 2010; Chen and Xu 2010; Gao 2010; Hicks 2010; Liu and Gallagher 2010; Tan 2010; Thabethe 2010; Yuan and Lin 2010; Zhou, Levine et al. 2010; Zhou 2010).

One ETIP or ETII can apply to multiple technologies, stages, actors or functions and multiple ETIPs. Similarly, multiple ETIPs or ETIIs can apply to the same technology, stage, actor or function. The overview does not determine the impact of each ETIP or ETII or compare their effectiveness. However, wherever possible the ETIIs and ETIPs are grouped and listed chronologically, such that similar or related ETIPs and ETIIs are listed together.

The results of this classification are used to compile the comparative frameworks for each country. These comparative frameworks are used as a basis for identifying opportunities for cooperation and coordination. The latter process is explained in more details in section 2.

Table 1. Abbreviations used in the classification.

Category	Abbreviation	Full description
Technology	FE	Fossil energy
	NE	Nuclear energy
	RE	Renewable energy
	EE	Energy efficiency
	TDS	Transmission, distribution and storage
	GE	General energy technologies
Stage	R&D	Research & development
	Demo	Demonstration
	Deploy	Deployment
Actor	supply	supply actors
	demand	demand actors
	interm.	intermediary infrastructure actors
	support	support infrastructure actors
Function	Kde	knowledge creation and development
	Kdi	knowledge diffusion
	RM	resource mobilization and allocation
	EA	entrepreneurial activities
	GoS	guidance of search
	CoL	creation of legitimacy
	MF	market formation

Table 2. Overview and classification of ETIPs and ETILs in Brazil.

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Petrobras Research Center	Its purpose is to meet Petrobras technological demands; 1500 employees, 30 pilot units and 137 labs (petrobras.com.br)	1973	FE	R&D-supply	KDe
EPE - Energy Research Company	Law 10.847; aim is to provide studies and research that supports planning of energy sector; authors of National Energy Plan and Ten Year Plan for Energy (epe.gov.br)	2004	GE	R&D-demand; Deploy-demand	GoS
CNPq - National Council for Scientific and Technological Development	agency of MCT to promote scientific and technological research and training of human resources (cnpq.br)	1955	GE	R&D-demand	GoS
FINEP - Brazilian Innovation Agency	publicly owned company subordinated to MCT; provides grants to non-profitable institutions and loans to companies & provides reimbursable and non-reimbursable funds, as well as fiscal incentives, to induce innovation (finep.gov.br)	1967	GE	R&D-demand	GoS; MF; Kde
CEPEL - Research Center on Electric Energy	Associated with Eletrobras, CEOEL is Brazil's electricity R&D institutions; conducts energy studies in efficiency, TDS and renewables. Runs programs like PROCEL, INMETRO, Luz no Campo, and rural electrification programs (cepel.br)	1974	TDS;EE;RE	R&D-supply; Deploy-demand	MF;KDe
CRESESB - The Brazilian Solar and Wind Energy Reference Center	Subdivision of CEPEL, which promotes the development of solar and wind through dissemination of knowledge, expansion of dialogue between stakeholders and encouraging implementation of studies and projects (cresesb.cepel.br)	1994	RE		KDi
Program of Research in Rural Electrification (PER/CEPEL)	Subdivision of CEPEL, provides technical support for rural electrification by providing R&D services for network optimization, testing of materials, socio-economic analysis, implementation of decentralized systems, support co-generation and apply remote sensing and geo-referencing data (cepel.br/~per)	2004	RE	Deploy-interm.	
CICOP - Research and Development Corporate Integration Committee	Established by Eletrobras to coordinate and stimulate innovation through patenting and cooperation among different institutes, promote basic R&D, and export new technologies (cgtee.gov.br)	2003	TDS	R&D-interm.	KDi
CNEN - National Commission on Nuclear Energy	Affiliated to MCT; mission is to develop and deliver nuclear and related technologies. CNEN invests in R&D, operates and maintains reactors and provides training and knowledge dissemination (cnen.gov.br)	1956	NE	R&D-interm.; R&D-supply	Kdi;Kde
ANEEL - Brazilian Electricity Regulatory Agency	Federal regulatory authority responsible for collecting, redistributing and allocating energy RD&D budgets to energy efficiency programs (aneel.gov.br)	1998	EE	R&D-demand	KDe
CCEE - Chamber of Electric Energy Commercialization	responsible for overseeing the electricity pool, in which the electricity price will be determined by pooling cheaper hydroelectricity with more expensive thermoelectric plants (natural gas) to encourage use of newly constructed thermal plants (WRI;ccee.org.br)	2004	FE	Deploy-interm.	
Interministerial Commission on climate change	Co-ordinating discussions on climate change; sets criteria for CDM projects (IEA RE)	1999	GE	Deploy-interm.	CoL
CT-Petro	Law 9.478, funded by oil and natural gas royalties. Areas of R&D: exploration, production, supply, gas/energy, management & centers. Goals are: generate knowledge, create centers of excellences, promote technological development and form highly qualified professionals (Almeida 2007;mct.gov.br)	1997	FE	R&D-demand; R&D-interm.	Kde;RM
CT-Energy	Law 9.991; funded by % of net sales electricity concessionaires. Electricity, nuclear, hydrogen, basic industry technology, renewables, human resources, cooperation. Aim is to promote R&D, increase international exchange and train human resources (mct.gov.br)	2000	GE	R&D-demand; R&D-interm.	Kde;RM
National Plan on Climate Change	policies on increasing energy efficiency, maintain high levels of renewable electricity supply, increase use of biofuels in transport and reduce deforestation (IEA EE)	2008	GE	deploy-support	CoL
Construction of Angra III	Investment of US\$4.6 bln into the construction of the Angra III plant; installation licence No. 591/2009 issued by Brazilian Institute of Environment and Renewable Resources in April 2009 and construction started in June 2010 (de Carvalho and Sauter 2009; WNA)	2006	NE	Deploy-supply	
Expansion plans for nuclear power	In 2008, the Brazilian government has announced plans to invest US\$212 billion in the construction of nuclear power plants, four 1 GW plants in 2015 at a single site, totaling a joint 60 GW (de Carvalho and Sauter 2009;WNA)	2006	NE		CoL
Proposal for constructing a 11 MW prototype reactor	Proposal to convert a prototype naval reactor into a 11 MW prototype; arrangements and design are expected to finalize in 2011 (WNA)	2009	NE		GoS
CCS demonstration project in Reconcavo Basin	RD&D project initiated by Petrobras and IFP to develop and validate technologies for CO2 injection (Dino and Gallo 2009)	2007	FE	Demo-supply	
Miranga Field Project on CCS	Project by Petrobras to remove 370 tons of CO2 per day, to prove ground for new technologies in new pre-salt discoveries; total investments are R\$ 250 mln (rigzone.com 02/10/09); not included in overview, because Petrobras is not 100% controlled by government	2009	FE		

Table 2. Overview and classification of ETIPs and ETIs in Brazil (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
PROALCOOL - National Alcohol Program	PROALCOOL included four key support policies; 1) requirements to buy a guaranteed amount of ethanol, 2) low interest loans to ethanol distilleries, 3) subsidized and regulated prices for ethanol to attract consumers and 4) production quota for sugar to establish export controls (Goldemberg et al. 2004). from 2003, tax breaks for flex fuel vehicles and alcohol vehicles and a favorable tax system (Hira and Oliveira, 2009)	1974	RE	Deploy-demand; Deploy-supply; Deploy-support	CoL;MF; RM; EA
PROBIODIESEL – Brazilian program of technological development for biodiesel	Program started in the 1970s and died in 1985 due to lack of financial resources. Invigorated in 2000 with tax incentives, extension of loan pay of periods, creating of regulation, compulsory targets and procurement of biodiesel (WRI; Sousa Jr. 2005)	1974	RE	Deploy-demand; Deploy-supply; Deploy-support; Deploy-interm.	EA;MF;RM; CoL
Tax incentives for small engines	Tax incentive for production of small engines (WRI)	1993	EE	Deploy-supply	MF
PRODEEM - National Programme for Energy Development of States and Municipalities	Initiative to take electric energy to agricultural communities; the government procures the necessary equipment and distributes it to community development projects (schools, health centers etc.); in 2006, BP Solar has installed PV systems as part of this program (WRI;api.org)	1994	TDS	Deploy-supply	
Law no. 9648	Financial incentives for generating electricity through small hydro (WRI)	1998	RE	Deploy-supply	MF
Thermal Electric program	Financing of 30% of construction costs of new gas plants (WRI)	1999	FE	Deploy-supply	MF
Resolution 245	Subsidy on fuel for remote diesel-based electricity system extended to include engines on vegetable oils to replace fossil fuel (WRI)	1999	RE	Deploy-supply	MF
Resolution 112	Requirements for registration and/or authorization of theormoelectric, wind or PV generating stations (WRI)	1999		Deploy-support	MF
Luz no Campo – Light in countryside rural electrification program	Program run by CEPEL; Electrification of 1 mln rural households with consumers expected to pay full cost over number of years; supports electrification through R&D support in network optimization and renewable technologies (WRI)	1999	TDS;RE	R&D-interm.	KDi
Reluz - National Program of Efficient Public Lighting	Improvement of efficiency of public lightning by replacing inefficient lightning; funds as much as 75% were provided by Eletrobras and at least 25% by local townships or interested utilities (Leite 2009)	2000	EE	Deploy-supply	MF; RM
PROEOLICA - Wind Energy Emergency Program	Government guaranteed beneficial purchase of wind-generated electricity by Eletrobras (WRI)	2001	RE	Deploy-supply	MF
Program of Incentives for Alternative Electricity Sources (PROINFA)	Initially incentives and subsidies for renewable technologies followed up by green energy certificate scheme; preferential loans, mandates and green certificate trading; Eletrobras buys renewable electricity at pre-set preferential prices for 20 years and can finance up to 70% of capital costs. (IEA RE;WRI)	2002	RE	Deploy-demand; Deploy-supply	MF;RM;CoL
Luz para todos - universalisation of electricity access	Coordinated by MME and executed by Eletrobras; follows up on 'Luz no Campo' and PRODEEM program with the aim to electrify all household by 2008. Process involves signing commitments, liberation of financial resources and administration of programs (IEA RE)	2003	TDS	Deploy-demand	RM;CoL
Resolution ANEEL 219	50% tariff discount to wind and biomass energy (WRI)	2003	RE	Deploy-supply	MF
Projeto Ribeirinhas	Demonstration projects for hydro, biomass and PV Microsystems for remote areas; provision of PV systems to 170 households and gasification systems based on wood serving 15 homes (WRI)	2004	RE	Demo-supply	
PNPB - National Program of Biodiesel Production and Use	The program was suggested in 2003 to organize production chains, lines of credit, structure the technological base and edit the regulatory framework (biodiesel.gov.br)	2004	RE		CoL
Law 11.907 - mandate for biodiesel blending	Law requires 2% biodiesel component blended into diesel oil in 2008 and 5% in 2013 (Rodrigues & Accarini, 2009;biodiesel.gov.br;IEA RE)	2005	RE	Deploy-demand	MF
Law 11.116 - Abatement of some or all federal excise taxes on biodiesel	Abates some or all federal excise taxes on biodiesel; the level is based on a combination of factors, such as feedstock used to product it, class of grower-seller and regional origin. To be eligible, biodiesel producers must require lincenses (Rodrigues & Accarini, 2009; Sousa Jr. 2005)	2005	RE	Deploy-support	MF
Sol Brasil	Marketing scheme (NORMASOL), qualification of installers (Qualisol Brazil), standards (PBE-Brazilian Labeling Program), and R&D support for SWH companies (APEC-ESIS 2010)	2008	RE	Deploy-supply; Deploy-support; Deploy-interm.; R&D-supply	MF;Kde
Global Reversion Reserve	Law 5.665/71; Tax designed to provide funds for improvement of energy public services through reversion, mergers and expansion (WRI)	1971			RM
CONSERVE - Efficiency in Energy Use Program	Low-interest loans to industrial firms for investment in oil conservation and/or substitution (WRI)	1981	GE	Deploy-demand	MF
PROCEL - National Program for Electric Power Conservation	Consumption labeling, support for R&D of efficient technologies and programs to replace old technologies; developed national energy efficiency test procedures and provides recognition and promotion of top-rated energy-efficient appliances (WRI)	1985	EE	R&D-demand	Kde;MF; CoL
CONPET - National program for the Rational use of Natural Gas and Oil Products	Umbrella legislation to obtain 25% energy efficiency gain in fossil fuel use; includes programs to set energy efficiency indexes, review technical standards, incentives to reduce fuel consumption and creating public awareness (WRI)	1991	EE	Deploy-demand; Deploy-interm.	CoL; MF

Table 2. Overview and classification of ETIPs and ETIs in Brazil (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Utility Energy Efficiency Obligation	Enforced by ANEEL, who obliges electric power distribution companies to invest in energy efficiency measures allocated to low-income energy efficiency programs (IEA EE; aneel.gov.br)	1998	EE	Deploy-supply	RM
National Policy for Conservation and Rational Use of Energy – Law no. 10,295	Standards for energy efficiency of machines and appliances manufactured or sold in Brazil (WRI)	2001	EE	Deploy-support	MF
Electrical Sector Act 10.438	Legislation for diversification of national energy portfolio with guaranteed power sales contracts for first 3300 MW of renewables; also extends Global Reservation Reserve (WRI)	2002	RE	Deploy-supply	MF
Electric Sector Model – Law 10.848/2004	Financial and regulatory model for electric sector to operate, bid and trade electric energy (WRI)	2004	GE	Deploy-support	
India-Brazil-South Africa Declaration on Clean Energy	Development, trade/investment, information exchange and cooperation to secure supply of safe, sustainable and non-polluting energy (IEA RE;WRI)	2003	GE	Deploy-interm.; R&D-interm.	KDI

Table 3. Overview and classification of ETIPs and ETILs in Russia.

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Department of Energy	Drafts and implements national policy and legal regulation in the oil and fuel sector, including electric power industry, renewable resources and petrochemical industry (minenergo.gov.ru)	2008	GE	R&D-supply	
ROSATOM - State Atomic Energy Corporation	Created by Federal Act in 2007 to 'create conditions for increasing competitiveness' in the international markets; Includes fundamental research (through the Kurchatov Institute, ITEP, IHEP & IITR), applied research (VNIINM, VNIKT, FEI, NIIIEFA, NIIAR, VNIITFA, SNIIP, NIKKHIMMASH, HIKIMT) and operation of nuclear-powered generation plants through AtomEnergy Prom (minatom.ru;atomenergoprom.ru)	2007	NE		CoL
Scientific and Technical Council Rosatom	Established by Federal Law (01.12.2007 no 317-FZ) to provide advise on the main directions of Rosatom's R&D activities (rosatom.ru)	2007	NE		GoS
Kurchatov Institute	conduct fundamental nuclear energy research; premier establishment for nuclear research (x-atom.ru;WNA)	1992	NE	R&D-supply	Kde
ITEP - Institute of Theoretical and Experimental Physics	conduct fundamental nuclear energy research (x-atom.ru)		NE	R&D-supply	Kde
Institute of High Energy Physics	conduct fundamental nuclear energy research (x-atom.ru)		NE	R&D-supply	Kde
Institute of Innovation and Thermonuclear Research, Troitsk	conduct fundamental nuclear energy research (x-atom.ru)		NE	R&D-supply	Kde
VNIINM - All-Russian Inorganic Materials Research Institute	Conducts applied research (x-atom.ru)		NE	R&D-supply	Kde
VNIKT - All-Russian Chemical Technology Research Institute	Conducts applied research (x-atom.ru)		NE	R&D-supply	Kde
FEI - Physics and Power Institute	conducts applied research; operates the AM-1 reactor (x-atom.ru; WNA)		NE	R&D-supply	Kde
NIIIEFA - D.V. Efremov Research Institute of Electrophysical Equipment	Conducts applied research (x-atom.ru)		NE	R&D-supply	Kde
NIIAR/RIAR - V.I. Lenin Nuclear Reactor Research Institute/ Research Institute for Atomic	Conducts applied research (x-atom.ru); Russia's State Scientific Centre, which is the largest nuclear research center and operates the BOR-60 fast reactor (WNA)	1956	NE	R&D-supply	Kde
VNIITFA - All-Russian Research Institute for Technical Physics and Automation	Conducts applied research (x-atom.ru)		NE	R&D-supply	Kde
SNIIP - Scientific Engineering Centre	Conducts applied research (x-atom.ru)		NE	R&D-supply	Kde
NIKKHIMMASH - Chemical Engineering Research Institute	Conducts applied research (x-atom.ru)		NE	R&D-supply	Kde
HIKIMT - Research and Design Institute of Installation Technology (Research and Production Association, Moscow)	Conducts applied research (x-atom.ru)		NE	R&D-supply	Kde
National Research Nuclear University	Previously called the Moscow Engineering and Physics Institute (MEPhI), includes educational establishments and is partly funded by Oratom and the Federal Education Agency (Rosobrazovaniye) (WNA)	2008	NE	R&D-supply	KDe
Ministry of Economic Development	Developed innovation strategies for Russia with several energy strategies; reducing energy intensity, efficient gas production and efficient development of national power sector (economy.gov.ru)		GE	deploy-support	
Department for State Governance of Tariffs, Infrastructural Reforms and Efficient Energy Use	Coordinates policies to increase energy efficiency, develops and implement common approaches to prices and carries out reforms in natural monopoly sector (economy.gov.ru)		EE	deploy-interm.	CoL
FASI - Federal Agency for Science and Innovation	Developed priority areas of the development of the Russian scientific & technological complex with energy and energy efficiency being one of the areas (fasi.gov.ru)		GE	R&D-demand	
Rosnano - Russian Corporation of Nanotechnologies	Development of membranes for flaring gas, coatings of pipes, solar panels , lightning systems and new insulation materials (rusnano.com)		EE: RE	R&D-supply	KDe
International Centre of Sustainable Energy Development	Provides research, technical expertise, information dissemination, develops databases, shares Best Practices and develops institutional and organizational capacity on sustainable energy (IEA RE)	2007	RE	R&D-interm.; Deploy-interm.	CoL;GoS; KDe;KDi

Table 3. Overview and classification of ETIPs and ETIs in Russia (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Climate Doctrine of the Russian Federation	Provides blueprint and target for development of energy system; targets are 47% of energy generated from gas, doubling capacity of nuclear and increase renewables to 4.5% of total electricity production (IEA EE)	2009	FE; RE; NE		CoL
Energy Strategy for Russia until 2030	written by Ministry of Energy and setting critical priority technologies; nuclear, hydrogen, new and renewable resources, power generation and fuel production from fossil, energy saving systems and energy efficient engines and propulsion devices (Shmatko 2009; Marakov 2009)	2009	NE; TDS; EE; RE	R&D-demand	GoS
Construction and completion of the Kalinin-4	Original design from 1986 after which constructed was delayed; construction complete in 2011 (WNA); not included in overview, since original technology is from 1986, the technology is not classified as 'innovative' .	1986	NE		
Refurbishment of 12 first-generation reactors	Lifetime extensions between 15-25 have been granted for first-generation reactors; extensive refurbishments are required (WNA). Not included in overview, since these are first-generation technologies these activities are not classified as 'innovative'	2000	NE		
Technology transfer on fast reactor	Russia helped the Chinese CIAE in 2000 to develop their fast reactor, the construction has finally started in 2011 (WNA)	2000	NE	R&D-interm.	
Upgrade of RBMK reactors	Significant design modifications and refurbishments for 11 operating RBMK reactors by Rosatom; new designs allow 45-year lifetime (WNA); not included in overview, because EU has condemned technology, upgrades are expensive and technology is not further developed	2006	NE		
Construction and completion of Rostov-2	Twin of 1000 MW Rostov, which build was started in 1979 and completed in 2001; build of Rostov-2 started in 2006 and connected in 2010 (WNA); not included in overview, since Rostov-2 is twin-technology from 1979, it is not classified as 'innovative'	2006	NE		
Construction of four standard-third generation WER reactors	Construction started in 2008 and the four units are to be commissioned in 2012-2014 (WNA); not included in overview, since these are standard technology, it is not classified as 'innovative'	2008	NE		
Construction and completion of Bolyarsk-4 BN-800 fast reactor	Construction started in 1987 and set to complete in 2012-2015; the first Bolyarsk is th largest fast neutron power reactor in the world (WNA)	1987	NE	Deploy-supply	
Upgrade fast neutron reactor	Upgrade of fast neutron reactor with licence renewal to 20-20 and increased fuel burn up from 7% to 11.4% (WNA)	2006	NE		
Nuclear energy development program	Announced in 2006, Russia's nuclear energy development program is funded by the federal budget (\$26 bln) and Rosatom (\$29 bln), so no private investments involved (WNA)	2006	NE	Deploy-supply	
Design of BN-800 reactor for China	St. Petersburg Atomenergopoekt has started design work on BN-800 reactor for China with high level agreement signed in October 2009 (WNA)	2009	NE	Deploy-interm.	
Approval of BN-1200 reactor design for Beloyarsk	The Rosatom Science and Technology Council has approved a BN-1200 reactor for Beloyarsk with construction starting in 2020 (WNA)	2009	NE		CoL
Design and testing of first floating nuclear power plant	Based on construction plans by Rosatom, the Nizhniy Novgorod Machine Engineering Plant (NMZ) has assembled and tested the first floating reactor (WNA)	2009	NE	R&D-supply	KDe
Technology transfer to demonstration of fast neutron reactor	In 2009, Russia signed an agreement to help China's development of indigenous fast neutron reactor as a 65 MW demonstration plant (WNA)	2009	NE	Demo-interm.	
Design and commissioning of third generation standardised VVER-1200 reactor	Lead units with higher efficiencies, longer life and greater power are being built at Novovoronezh II and Leningrad with operation expected in 2013-2015 (WNA)		NE	Deploy-supply	
Design of generation IV Gidopress	Design of supercritical VVER with higher efficiency and breeding ratio (WNA)		NE	R&D-supply	KDe
Design and construction of BREST lead-cooled fast reactor	Funding for commissioning of 300 MW BREST Unit at Beloyarsk approved in 2010 (WNA)	2010	NE	Deploy-supply	
Federal Targeted program 'Nuclear Power Technologies of the New Generation for 2010-15	earmarking R&D funding for nuclear (R.F. Government Directive of July 23, 2009, No. 1026-r)	2009	NE	R&D-supply; R&D-demand	Kde; GoS
Federal Target Program "Research and Development on Priority directions of scientific-technological complex of Russia 2007-2012"	the aim is to develop and implement highly effective resource technologies through 1918 different commercialization projects (co-financed with business involvement) with funding of more than 10 bln roubles (Klimenko 2008)	2006	RE	Deploy-supply	RM
FTP EEE - Federal Targeted Program for an Energy Efficient Economy for the period 2002-2005 with an outlook to 2010	Sets targets and outlines measures for energy efficiency improvements; includes a budget for equipment, external expertise, infrastructure, labour costs and R&D (4%) (ieej.or.jp/aperc)	2001	EE	R&D-supply; Deploy-interm.	RM; CoL; KDe
FLEC IEE - Energy Conservation and Increase of Energy Efficiency, Federal Law No. 261-F3	Mandatory energy monitoring and regular auditing for heat and power usage of buildings, energy-intensive equipment, and other energy-consuming entities (ieej.or.jp/aperc)	2009	EE	Deploy-interm.	

Table 3. Overview and classification of ETIPs and ETIs in Russia (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
№ 889 "On some measures to improve the energy efficiency of the Russian economy and orders of the Government of the Russian Federation dated	Decree by Presiden, which consists of the development of a modern regulatory framework, formation of organizational structures, states support for investments, public-private partnerships and information and educational support to improve energy efficiency (minenergo.com)	2008	EE		CoL
State Policy Guidelines for Promoting Renewable Energy in the Power Sector (Federal Law "on Electric Power Industry")	Strategic planning, regulation and improvement of monitoring RD&D; the policy establishes targets for RE, promotes the development of SMEs in the energy power sector, provides a feed-in premium for RE sources, mandates wholesale electricity buyers to purchase a particular volume, improves legal framework for construction of RE generating facilities and provides training for design and operation (IEA EE)	2009	RE	Deploy-supply; Deploy-interm.; Deploy-Demand	EA; GoS; CoL; MF
Federal program on the use of rapeseed	Federal program by Ministry of agriculture encouraging production and processing of rapeseed (Pristupa, Mol et al. 2010)	2008-2010	RE	Deploy-supply	MF
National Standards Biofuels	Since 2002, several standards have been developed for bioethanol with the National Standard "OCT P 52808-2007" developing key definitions and terminology for biofuel production. No standards for blending of biodiesel (Pristupa, Mol et al. 2010)	2002	RE	Deploy-interm.	MF
Biotekhnologii	Founded in 2008 by Rostekhnologii to create specialised industries in advanced processing of renewable feedstock; mainly interested in consolidating existing bioindustry companies with Russian state's equity shares (Pristupa, Mol et al. 2010)	2008	RE	Deploy-interm.	CoL
Programme for energy efficient economy	Target and outline measures for energy efficiency with 26% reduction in 2010 (IEA EE)	2001	EE		CoL
Supercritical CFBC based power plant	Commercial development of Russia's first supercritical CFBC power plant (330 MW) to be installed at Novocherkassk by PJSC EnergoMashinostroitelny Alliance (IEA CCC)	2000	FE	Deploy-supply	
EBRD Loans for Russian Hydropower	Loans for nine hydropower stations (IEA RE)	2006	RE	Deploy-supply	MF
Regional codes for energy efficient buildings	Development of building codes in accordance with federal building standards; includes incentives for exemplary performances or mandates for auditing (IEA EE)	1995	EE	Deploy-interm.	MF
Standards for building energy audits	Standardised methods for buildings and structures (IEA EE)	2003	EE	Deploy-interm.	MF
Microclimate parameters in residential and public buildings	Code for temperature and humidity accounting for building efficiency and energy consumption (IEA EE)	1996	EE	Deploy-interm.	
HELP - Heat Efficiency Leveraging Program	Program together with USAID to develop regional building codes, feasibility studies and business plans to increase energy efficiency (IEA EE; cenef.ru)	2000	EE	Deploy-interm.	MF
Model program of improving district heating efficiency	Energy efficiency improvements to boiler houses and central heating points (IEA EE)	1996	EE	Deploy-supply; Deploy-demand	IK
Enterprise Housing Divestiture Project	Program with the World Bank to energy audit and monitor housing stock for demonstration projects and develop a database on energy efficiency measures (IEA EE)	1994	EE	Demo-demand; R&D-interm.	KDi
"About the Main Principles of Bioenergy Development in Russian Federation"	Law by Ministry of Agriculture to establish legal, economic, ecological, social and organizational principles for the production and use of biofuels (Pristupa, Mol et al. 2010)	not accepted yet	RE	Deploy-interm.	CoL

Table 4. Overview and classification of ETIPs and ETILs in India.

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Bhabha Atomic Research Centre at Department of Atomic Energy	largest R&D research institute at the Department of Atomic Energy (barc.ernet.in)	1944	NE	R&D-supply	KDe
Indira Gandhi Centre for Atomic Research at Department of Atomic Energy	R&D research institute at the Department of Atomic Energy; mainly involved in research on fast breeder reactors as part of Stage 2 of India's Nuclear Program (igcar.ernet.in);	1971	NE	R&D-supply	KDe
SSRC - Standing Scientific Research Committee	Part of Ministry of Coal; plans, programs, budgets, and oversees implementations of research projects and to seek application of the findings of the R&D work done (coal.nic.in)		FE	R&D-interm.; R&D-supply	Kde
CMPDI - Central Mine Planning and Design Institute	Research organization of the largest state-owned coal company Coal India Ltd. (CIL), which coordinates research activities (cmpdi.co.in)	1976	FE	R&D-interm.	
NLC - Neyveli Lignite Corporation	State-owned enterprise with R&D facilities (nlcindia.com)	1828	FE	R&D-supply	KDe
Singrauli Collieries Company Ltd.	State-owned enterprise with R&D facilities (sclmines.com)	1886	FE	R&D-supply	KDe
OIDB - Oil Industry Development Board	Part of Ministry of Petroleum and Natural Gas: created to address the need of self-reliance in petroleum and petroleum-based products; provide loans and grants fro R&D projects (oidb.gov.in)	1974	FE	R&D-supply; Demo-supply; Deploy-supply	Kde;RM
NGHP - National Gas Hydrate Programme	Liaised to the OIDB, the project to map out gas hydrates as a future alternative energy source; consisted of comprehensive analyses & sampling (oidb.gov.in)	1997	FE	Deploy-interm.	
RGIPT - Rajiv Gandhi Institute of Petroleum Technology	Liaised to OIDB, the institute is established as a single training and education institution that can render expert training to the petroleum industry (oidb.gov.in)	2006	FE	Deploy-support	
HCF - Hydrogen Corpus Fund	Liaised to OIDB, it is a nodal agency to establish hydrogen as a future energy source for the transport sector. CHT coordinates and funds research work in refining and marketing area, exchange of information and assessing technology requirements (oidb.gov.in)	2004	TDS	Deploy-interm.; R&D-interm.; R&D-supply	CoL; Kdi; DKe
CHT - Centre for High Technology	Part of Ministry of Petroleum and Natural Gas: implements scientific and technological programs; it also establishes R&D action plans with its members and identifies/mission where technological development is needed (cht.ind)	1987	FE	R&D-interm.	Kdi; Kde
PCRA - Petroleum Conservation Research Authority	Part of Ministry of Petroleum and Natural Gas: formulates strategies and promote measures for accelerating conservatoin of petrolioum products; conducts sectoral energy efficiency and conservation programs and administers R&D projects (pcra.org)	1978	EE	R&D-interm.	KDi
National Biofuel Centre, PCRA	Massive multi-media awreness and campains on biofuels, mobilizing stakeholders and providing financial support during the period between plantation to yield time (pcra-biofuels.org)		RE	Deploy-interm.	KDi
Oil India Ltd.,	state-owned enterprise with R&D facilities (oilindia.nic.in)	1889	FE	R&D-supply	KDe
Gail India Ltd.,	State-owned enterprise with R&D facilities (gailonline.com)	1984	FE	R&D-supply	KDe
Hindustan Petroleum Ltd.,	State-owned enterprise with R&D facilities (hindustanpetroleum.com)	1952	FE	R&D-supply	KDe
ONGC Ltd.	State-owned enterprise with R&D facilities (ongcindia.com)	1956	FE	R&D-supply	KDe
Central Power Research Institute (CPRI) of the Ministry of Power	Created as a centre for applied research assisting the electrical industry in product development; it supports technology deployment as well as R&D expenditure (cpri.in)	1960	TDS	R&D-supply; R&D-interm.; Deploy-support	KDe
Bureau of Energy Efficiency (BEE)	Within Ministry of Power: Standards and labeling program, accreditation of energy auditors, national energy conservation awards and campains (bee-india.nic.in)	2001	EE	Deploy-support	MF
NPTI - National Power Training Institute	Within Ministry of Power: designated institute for training (npti.in)		EE	Deploy-support	MF
BHER - Bharat Heavy Electricals Ltd.	state-owned enterprise with R&D facilities; has experimented with fluidized bed coal gasifiers since 2003 (Shackley and Verma 2008; bhel.com)	1972	TDS;FE	R&D-supply	KDe
MNRE - Ministry of New and Renewable Resources	The Ministry of New and Renewable Energy (renamed in 2006) covers the following areas of R&D: (1) Solar Energy Programme, (2) Biogas Programme, (3) Wind Energy Programme, (4) Biomass Programme, (5) Others Sources of Energy, 6) Small Hydel Programme, and (7) National Institute of Renewable Energy (mnre.gov.in)	1992	RE	R&D-supply	KDe
SSS NIRE - Sardar Swaran Singh national Institute of Renewable Energy	Conducts state-of-the-art research, design and development activities for renewable energy, energy needs in rural areas and human resource development (mnre.gov.in)	2009	RE	R&D-supply	KDe
IREDA - Indian Renewable Energy Development Agency Limited	Promotes, develops and extends financial assistance (through loans) to renewable energy and energy efficiency projects (ireda.in)	1987	RE; EE	Deploy-supply; Demo-supply	RM
New Technology Group	Funding for R&D and demonstration projects for 1) chemical sources of energy (fuel cells), 2) hydrogen energy, 3) geothermal energy and 4) ocean energy (mnre.gov.in)	2005	RE; EE	R&D-supply	Kde; Gos

Table 4. Overview and classification of ETIPs and ETILs in India (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
SEC - Solar Energy Centre	Dedicated unit of MNRE to develop new solar energy technologies and promote their application through product development; provides R&D, technology evaluation, testing and standardization and human resource development (mnre.gov.in/sec)	1982	RE	R&D-supply; Deploy-interm.	KDe
CWET - Center for Wind Energy Technology	Autonomous organization under administrative control of MNRE for wind power development; it conducts R&D, provides testing and standardification unites and information, training and commercialization units (cwet.tn.nic.in)	1998	RE	R&D-supply; Deploy-interm.	KDe
Alternate Hydro Energy Centre	AHEC provides technical support to state and central governments with R&D labs, carries out energy auditing projects and provides design and consultancy services to small hydel projects (ahec.org.in)	1982	RE	R&D-supply; Deploy-interm.	KDe
JNNSM - Jawaharlal Nehru National Solar Mission	National Action Plan with the objective to establish India as a global leader in solar energy by creating policy conditions for its diffusion across the country. Provides targets (>20 GW in 2022), creates favourable conditions for manufacturing and promotes programmes for off grid applications (mnre.gov.in/pdf/mission-document-JNNSM.pdf)	2010	RE		GoS
National Action Plan on Climate Change	Developed by the Prime Minister's council on Climate Change; provides eight national mission with two energy technology focus areas: solar energy and energy efficiency (pmindia.nic.in;IEA EE)	2008	RE;EE		CoL
11th Five-Year Plan of India	The Planning Commission proposed energy R&D initiatives in the Eleventh Plan; Focus on improving energy efficiency through 'Accelerated Power Development and Reform Programme) with focus on auditing, labeling and higher efficiency standards. R&D on clean coal, in-situ coal gasification, solar PV and solar thermal, cellulosic extraction of ethanol and improvement of oilseed yields (planningcommission.nic.in, table 10.33)	2007	GE	R&D-demand; Deploy-demand	GoS
Integrated Energy Policy	Planning Commission report suggesting three approaches for energy R&D (p. 103): 1) technology development missions that require coordinated R&D of all stages of the innovation chain to reach a targeted goals, 2) technology roll out mission to develop and roll out commercial or near commercial technology, 3) broad based R&D support to research institutions, universities and project funding. Recommendations are: 1) A National Energy Fund (NEF) to finance energy R&D, 2) governance of NEF by independent board of government officials and outside experts to fund energy research consortia, 3) energy companies should be mandated to spend 0.4% of their turnover on R&D (Planning Commission 2006;IEA RE)	2006	GE		CoL
Electricity Act 2003	Initiated in 2003, establishes the development of a National Electricity Policy, provides liberty to operate and maintain generation stations without obtaining a license if it complies to technical standards; the act was amended in 2007 (WRI;powermin.nic.in)	2003	TDS	Deploy-support	MF
IGCC demonstration plant	BHEL runs a 6.2 MW IGCC demonstration plant; it will be converted to generate power to the grid (Ghosh 2008; IEA CCC)	1988	FE	Demo-supply; Demo-demand	
Deployment of two 800 MW supercritical boilers	NTPC commissioned 2 x 800 MW supercritical boilers, which are going to be developed and delivered by the SOE Bharat Electrical Ltd. (Shackley and Verma 2008)	2008	FE	Deploy-supply; Deploy-demand	
Ultra Mega Power Projects - UMPPs	Commissioning of public-private partnerships to develop 4000 MW of power projects; regulation for increased power load factors (PFR), based on tariff-based bidding process and includes mandatory higher size thermal units with supercritical parameters (Joy 2008; Shackley and Verma 2008; TERI 2010; IEA CCC)	2008	FE	Deploy-supply; Deploy-demand	
IGCC demonstration plant	BHEL and APGENCO are developing 125 MW demonstration plant (possibly 180 MW) in Vijaywada in Andhra Pradesh to be commissioned in 2011; the plant uses technology from GE (TERI 2009; IEA CCC)	2008	FE	Demo-supply; Demo-demand	
Commissioning of supercritical coal-fired power stations	NTPC is commissioning a supercritical 600 MW power station in Sipat in 2009; Subsequently, nine more units of 660 MW each and one of 800 MW (ultrasupercritical, or USC) are expected to be commissioned until March 2012 (TERI 2009)	2009	FE	Deploy-supply	
Renewable Portfolio Standard	The CERC obliges state owned utilities to purchase at minimum 5% of their grid purchase from renewable energy sources from 2009-10 onwards and 15% by 2020 (REN21)	2009	RE	Deploy-supply	MF
New Feed-in Tariff Regulations	Issued by CERC, it provides guidelines for calculating feed-in tariffs applicable to all renewable energy projects and based on a formula that allows for project-specific tariffs for 13 years, extended to 35 years for small hydro and 25 years for PV and solar thermal (IEA RE; cercind.gov.in)	2009	RE	Deploy-supply	
Guidelines for import nuclear energy technologies	DAE sanctioned benchmark capital costs for imported nuclear reactors at \$1600/KW (WNA)	2008	NE	Deploy-demand	
India's nuclear power expansion plan	In 2008, NPCIL announced that it would start stie work for 12 reactors, including eight PWR (four indigenous, four imported), three or four fast breeder reactors and 1 300 MW advanced heavy water reactor (WNA)	2008	NE		CoL

Table 4. Overview and classification of ETIPs and ETIs in India (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Design of 300 MW AHWR	Development of critical facility at BARC to test the design for the first 300 MW AHWR (WNA)	2008	NE	R&D-supply; R&D-demand	Kde; GoS
Commission of 4 x 700 MW indigenously build PHWR unit	Commissioning of four 700 MW reactors by the state-owned Nuclear Power corporation of India (NPCIL); construction has started and is scheduled to operate in 2017 (WNA)	2009	NE	Deploy-supply	
Commissioning of 2000 MW power plant	Joint venture between NPCIL and National Thermal Power Corporation (NTPC) (which is 89.5% government owned) signed in 2010 (WNA); using local and imported technology (WNA)	2010	NE	Deploy-supply	
500 MW fast breeder reactor at Kalpakkam	Prototype under construction by HAVINI, a government enterprise set up under DAE to focus on FBR; scheduled to produce power in 2011 (WNA)		NE	Demo-supply; Demo-demand	
Comission of 2 x 950 MW VVER-1000 reactors	First large reactors; build by NPCIL with technology and supervision from Russia's Atomstroyexport; to be operational in 2010 (WNA)		NE	Deploy-supply	
Rural Electricity Supply Technology (REST) Mission	Electrification of rural household through development of indigenous technologies and operationalise the schemes on commercially feasible schemes (innovative financing, grassroot institutional arrangements) (powermin.nic.in/rural_electrification/rest_mission)	2002	TDS	Deploy-supply; Deploy-interm.	EA; MF
SWES - Programme on Small wind Energy and hybrid systems	The objective of the program is to develop technology and promote applications; activities consist of financial support for setting up water pumping wind mills and aerogenerators/wind solar hybrid systems, field trials & performanc evaluation, grid connected SWES on demonstration basis and R&D (mnre.gov.in/adm-approvals/wind-hybrid-system.pdf)	2006	RE	R&D-supply	KDe
Research, Design and Development of Solar Thermal Technologies	Financial support for RD&D projects, test centers and capacity building with applications in industry	2006	RE	Demo-supply	GoS
Promotion of Grid Interactive Power Generation Projects	Central scheme providing central financial assistance to biogas plants, biomass gasifiers, solar PV, solar PV in urban areas, SPV water pumping systems, solar thermal systems, Akshay Urja Shops (retail outlets servicing renewable energy devices and systems) and remote village electrification. Financial assistance consists of subsidized loans, capital subsidies and production subsidies (mnre.gov.in/indg.in)	2006	RE	deploy-supply	RM
Generation based incentives for wind power	Coordinated by MNRE and IREDA, it provides feed-in tariffs for new wind power projects validated by Center for Wind Energy Technology and > 5 MW (IEA RE)	2008	RE	Deploy-supply	MF
Government Assistance for wind power development	Tax reduction and exemptions and accelerated depreciation (IEA RE; IREDA)	2003	RE	Deploy-supply	MF
Programme on Small wind Energy and hybrid systems - SWES	The objective of the program is to develop technology and promote applications; activities consist of financial support for setting up water pumping wind mills and aerogenerators/wind solar hybrid systems, field trials & performanc evaluation, grid connected SWES on demonstration basis and R&D (mnre.gov.in/adm-approvals/wind-hybrid-system.pdf)	2005	RE	Demo-supply; R&D-supply	Kdi; KDe
Solar Power Generation Based Incentive	Coordinated by MNRE, it provides a feed-in tariff of 12 and 10 rupees per kwh for PV and solar thermal over 10 years (IEA RE)	2008	RE	Deploy-supply	MF
Grid Connected Solar PV Power Generation Projects	Demonstration programme by MNRE to encourage grid quality power generation from MW size solar power plants; financial assistance in terms of loans restricted to 70% of total project costs (pfcindia.com/solar_pv_power_plant_policy.pdf)	2008	RE	Deploy-supply	RM
Demonstration and promotion of solar photovoltaics devices in urban areas & industry	Financial support for installation, demonstration and promotion of PV systems; provides Rs.75-150 per watt of energy conservation to a maximum of the cost of the system (WRI; mnre.gov.in)	2005	RE	Demo-supply; Deploy-supply	MF
Accelerated development and deployment of SWH systems in domestic, industrial and commercial sectors	Subsidized rate of interest (5%), capital subsidies, seminars, workshops and training programs to add 1 mln sq mtrs of SWH systems; INR 150 mln for fiscal year until 2011 (administred by IREDA)	2005	RE	Deploy-demand; Deploy-supply; Deploy-interm.	MF; RM; EA
Energy Conservation Act	Legal framework, institutional arrangements to save 23% energy in 2012 through 1) pilot programs in government buildings, 2) development building codes, 3) standards and labeling program, 4) demand side management through utility companies, 5) educational programs and 6) setting up awards. It also established BEE (WRI; powermin.nic.in ; IEA EE)	2001	EE	Deploy-interm.; Deploy-demand; Deploy-support; Demo-supply	GoS; MF; RM; CoL

Table 4. Overview and classification of ETIPs and ETIs in India (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Energy conservation building code	Purpose of the code is to provide minimum requirements for energy-efficient design and construction of buildings; the code is mandatory and applies to building envelopes, mechanical systems and equipment, service hot water heating, lighting and electrical power & motors (MoP 2007; IEA EE)	2007	EE	Deploy-interm.	
ECOMARK scheme	Voluntary non-binding labelling scheme for environmentally friendly products; the purpose of the scheme is to increase consumer awareness and to incentivise manufacturers (WRI:cpb.nic.in)	1991	EE	Deploy-interm.; Deploy-demand	CoL
National energy labeling programme	Executed by BEE, it includes a mandatory for electricity-consuming appliances in 2007 with 1- to 5-star grading (IEA EE)	2006	EE	Deploy-demand	MF
National Campaign on Energy Conservation NCEC	Raising awareness on energy savings opportunities in industry, commerce, agriculture and households - through painting competitions at school (bee-india.nic.in)	2007	EE	Deploy-support	
Pre-payment electricity meter	Introduction of metering system for government departments to discourage power usage (WRI;IEA EE)	2007	EE	Deploy-demand	
Energy Conservation for Tea Production	Demonstration project in 30 tea processing units through procurement of energy efficient equipment with awareness to other tea sectors; Focus is on adoption of new technologies, best practice and knowledge sharing and the project is funded through GEF (WRI)	2007	EE	Demo-supply; Demo-interm.	
National Biogas and Manure Management Programme	Subsidies for maintenance and repairs of biogas plants (WRI;mnre.gov.in)	1981	RE	Deploy-support	
EBP - Ethanol Blending Program	Mandate to use 5% ethanol blend in petrol in 2003, 10% in 2008 and targets 20% in 2017; since 2006 provides feed-in tariff of 21.50 rupees/liter. Implementation deferred due to short supply of sugarcane and sugar molasses in 2008/2009 (gain.fas.usda.gov)	2003	RE		CoL
Biofuel Policy/ Biofuel Scheme	Mandatory law to increase blend of ethanol in gasoline from 5% to 10% in October 2008; provides indicative target of min. 20% ethanol-blended petrol and diesel in 2017 and sets up national Biofuel Coordination Committee and Biofuel Steering Committee and puts in place a certification mechanism for blending exercises. Finally, minimum support prices for biodiesel oils and minimum purchase prices for bio-ethanol would be established (igovernment.in;IEA RE; IREDA)	2008	RE	Deploy-demand; Deploy-supply	MF
Biomass Power Generation	fiscal incentives for biomass power generation, including 100% depreciatio for a range of boilers and wate heat recovery equipment, 10 year tax holiday and tax exemptions (IREDA)	2004	RE	Deploy-supply	
Biogas based Distributed/Grid Power Generation Programme	central financial assistance up to Rs. 3000-4000 per kW depending on the capacity and limited to 40% of plant cost; financial assistance available to any organization, entrepreneur or institution; financial assistance for workshops on specification & standards, operation & maintenance and training (mnre.gov.in/adm-approvals/biogaspower_a.pdf; IEA RE)	2008	RE	Deploy-supply; Deploy-interm.	EA; RM
Accelerated programme on energy recovery from urban wastes	Fiscal and financial regime to develop, demonstrate and disseminate utilization of waste; 8 demonstration projects have been set up	2005	RE	Demo-demand	
The Air (Prevention and Control of Pollution) Act	Enforcement of auto emission standards (moef.nic.in)	1981	EE	Deploy-demand	CoL
Auto fuel policy	Standards for efficient vehicles (WRI;aperc-biofuels.org)	2003	EE	Deploy-demand	MF
Rajiv Gandhi Gramin LPG Vitrak	Program by MoPNG to set up small distribution agencies ot promote deployment of LPG in rural areas; provides guidelines for locals that would like to operate such agencies (indg.gov.in)	2009	FE	Deploy-supply	EA
Support for Mass Rapid Transit System	Ministry of Urban Development supports MRTS, including Bus Rapid Transit Systems (BRTS) with financial assistance if the projects are supported through a Comprehensive Mobility Plan (pib.nic.in)	1995	EE	Deploy-supply	CoL
National Hydrogen Energy Road map	Development and demonstration of hydrogen powered engines and power systems; targets are 1 mln vehicles and 1000 MW of power in 2020. Activities are research activities for hydrogen production, storage and utilization (WRI;mnre.gov.in)	2006	TDS	R&D-supply	GoS; KDe
India – japan Energy Forum	Energy policy, supply and conservation in industry by exchaing information on national policies and the industry's status (WRI;teriin.org)	2006	EE	R&D-interm.	KDi
India-Brazil-South Africa Decleration on Clean energy	Development, trade/investment, information exchange and cooperation to secure supply of safe, sustainable and non-polluting energy (WRI)	2003	GE	R&D-interm.; Deploy-interm.	KDi

Table 5. Overview and classification of ETIPs and ETIs in Mexico.

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
CFE - Comision Federal de Electricidad	State-owned electricity company, which in 2009 finances a research project at Mario Molina Center on IGCC using petcoke, with CO2 capture and utilization of EOR and finances feasibility studies on converting oil stations to coal including CO2 capture (Santalo 2009; cfe.mx.gob)		FE	R&D-supply	KDe
PEMEX - Petroleos Mexicanos	State-owned oil & gas company conducting energy R&D; in 2009 PEMEX started a project separating CO2 at an Ammonia plant for EOR at "Cinco Presidentes" (Santalo 2009; pemex.com)		FE	R&D-supply	KDe
IMP - Mexican institute of Petroleum	Public R&D institute associated with PEMEX, but funded by the government (imp.mx)	1965	FE	R&D-supply	KDe
ININ - National Institute of Nuclear Research	Public R&D institute for nuclear energy (inin.gob.mx)	1979	NE	R&D-supply	KDe
IIE - Electric Research Institute	Public R&D institute for innovation in the electrical industry; research areas include energy sources (renewables, nuclear), control systems, electrical systems (transmission, distribution) and mechanical systems (chemical and thermal processes); started a Oxycombustion furnace and postcombustion capture pilot program in 2008 and a project on exploring algae fields using CO2 from Puerto Libertad Station to produce ethanol; (iie.org.mx; Santalo 2009)	1975	TDS	R&D-supply	KDe
CONUEE - National Commission for Energy Efficiency	provides information, certifies bodies, verifies accreditation and is responsible for labelling (conuee.gob.mx)	2008	EE	Deploy-interm.	CoL; KDi
CNH - National Commission for Hydro Carbons	Established in 2009, this commission is responsible for creating technical guidelines, information dissemination, recording of policies and resolutions and evaluating operational efficiency (www.cnh.gob.mx)	2009	FE	Deploy-interm.	CoL; KDi
COFER - Advisory Council for Renewable energy Development	analyzes implementation of renewable energy projects, identifies, promotes and coordinates opportunities, mechanisms, conditions and funding sources (conae.gob.mx)	1996	RE	R&D-interm.; Demo-interm.	KDi; GoS
COMIA - Mexican Council for Municipal Infrastructure	advises on how to provide energy supply in municipalities (Huacez 2005)	2002	TDS	Deploy-interm.	KDi
National Development Plan 07-12	SENER strategy document that mentions energy infrastructure, efficient energy use and diversity as prime drivers to tackle poverty (pnd.presidencial.gob.mx)	2007	GE		CoL
Sectoral Energy Program 07-12	SENER program that provides targets for energy efficiency savings (43 TWh), renewable electricity sources (from 23.6 to 26%) and CO2 emission reduction targets (tinyurl.com/prosener)	2007	GE		GoS
National Program of Infrastructure 07-12	SENER program of energy infrastructure investments through public-private partnerships (Infraestructura.gob.mx)	2007	GE		RM
Special Program for Science, Technology and Innovation 08-12	SENER program providing strategies for science, technology and innovation programs in energy R&D (Hicks 2010; sener.gob.mx)	2008	GE		GoS
National Strategy on Climate Change	Policy document by interministerial commission on climate change, which created several incentives and institutions promoting energy RD&D (semarnat.gob.mx)	2007	GE		CoL
Environmental upgrade coal-fired power plant	Upgrade by PNM of San Juan Generating Station coal-fired power plant to reduce emissions by 14 mega tons p.a. (IEA CCC); not included in classification, because PNM is not state-owned.	2006-2009	FE		
Renewable Energy Initiative	Part of international Action Plan; procurement of large scale renewable energy projects and foster research, technological development and capacity building in renewables to achieve 40% installed capacity in 2014; Mexican government is financing new hydro and renewable energy plants (WRI;REN21)	2004	RE	Deploy-supply	GoS; MF
Guide to the Implementation of Renewable Energy Projects for Electricity Generation in Mexico	Guidelines explaining administrative procedures for project developers of renewable energy projects, developed by former CONAE but still in force (tinyurl.com/GuiaER)	2006	RE	Deploy-interm.	
LAERFTE - Law for the Use of Renewable Energies and Financing of the Energy Transition	Law for regulating the use of renewable energies for electricity generation, which makes SENER responsible for a Special Program for the Use of Renewable Energy (LAFRE), provides a National Inventory of Renewable Energy, provides a method to evaluate externalities of renewable power generation and mandates the Energy Regulatory Commission (ERC) to install norms, guidelines and administrative provision for renewable energies, define rates that should be paid to private generators and determine capacity (tinyurl.com/laerfte)	2008	RE	Deploy-interm.	CoL
LAFRE - Law for the Use of Renewable Sources of Energy	Framework to introduce min. 8% renewable in the electricity system in 2012. Several funds for promoting renewable energy (sener.gob.mx)	2009	RE	Deploy-supply	MF
LASE - Law for the Sustainable Use of Energy	Transformed CONAE into CONUEE and established the implementation of the National Program for Sustainable Use and Energy (tinyurl.com/LApSuEn)	2008	EE	Deploy-interm.	CoL

Table 5. Overview and classification of ETIPs and ETIs in Mexico (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
LPDB - Law for the Promotion and Development of Bioenergy	Creates inter-sectoral Commission on Bioenergy, implements a program for the Sustainable Production of Bioenergy Inputs and for Scientific and Technological Development by SAGARPA and implements a Program for the Introduction of Bioenergy, with the aim of creating the necessary changes to incorporate biofuels into the fossil fuel mix (tinyurl.com/ldpyddlb; tinyurl.com/rdpyddlb)	2008	RE	R&D-supply; Deploy-supply; Deploy-interm.	Kde; MF; CoL
Special Program for the Use of Renewabl Energy	Broad guidelines for government actions on renewable energy (tinyurl.com/REpmexico)	2009	RE		CoL
CIEI - Interconnection contract for intermittent renewable energies	Resolution by ERC governing connecting renewable electricity sources to the grid (tinyurl.com/res140)	2007	RE	Deploy-interm.	MF
Interconnection contract for small scale solar energy sources	Resolution by ERC to allow households and small business to connect solar electricity sources (tinyurl.com/solarpeq)	2007	RE	Deploy-supply	MF
Grid-Connected wind power	Construction of wind farm facilitating technology and skills transfer (WRI)	2007	RE	Demo-demand	
Contract Model for the Sale and Purchase of Electricity under the Modality of Small Power Producer	Resolution by ERC applicable to any small scale project (< 30MW) that sell electricity to power utilities; includes higher prices for renewable energy (tinyurl.com/ContPeq)	2008	RE	Deploy-interm.	MF
Initiative of modification of the Income Tax law (article 40, fraction XII)	Fiscal credit of 30% of investment in RE electricity generating equipment in residential sector (tinyurl.com/LISR2008)	2008	RE	Deploy-supply	
NADF-008-AMBT-2005	Establishes the technical specifications for solar water heating systems in range of applications (sma.df.gob.mx)	2006	RE	Deploy-interm.	MF
Official Mexican Norms for solar heaters	Norm established by the Government of the Federal District (GDF) that new establishments for water heating (pools, showers, sinks, kitchens, laundry) should cover a min. 30% of energy consumption from solar heating systems (WRI; ine.gov.mx)	2006	RE	Deploy-demand	CoL; MF
PROCALSOL - Program for the Promotion of Solar Water Heaters in Mexico 2007-2012	Program with the goal to establish 1.8 million m2 of solar water heaters in 2012 (tinyurl.com/ProcalSol)	2007	RE	Deploy-demand	
PAESE - Energy Savings Program for the Electricity Sector	Program (Programa de Ahorro de Energia del Sector Electrico) initiated in 1989 by CFE to accelerate construction and entrance of efficient electric power systems; installed the Trust to Save Electricity (FIDE) and the Trust for Thermal Insulation (FIPATERM); currently advises and guides users (WRI; conae.gob.mx)	1989	EE	Deploy-interm.	Kde; CoL
National Award for Electrical Energy Saving	Public recognition for organization and companies with energy savings (WRI)	1991	EE	Deploy-support	CoL
Voluntary standards under the Federal Metric and Standardization Law	provides voluntary standards (NMX) for energy efficiency	1992	EE	Deploy-interm.	
Mandatory standards under the Federal Metric and Standardization Law	Mandates energy efficiency standards (NOM) for a range of appliances ranging from air conditioners (2006), lighting (2004), washers (2000), insulation (1995) etc. (ieej.or.jp/aperc)	1992	EE	Deploy-demand	MF
FIDE - The Electrical Power Saving Trust Fund Label	Voluntary label for manufacturers that conform to energy efficiency standards (WRI; IEA EE; fide.org.mx)	1995	EE	Deploy-interm.	
Energy Saving Program for the Federal Public Administration	Protocol to establish a process of continued improvement of energy efficiency in real estate, vehicle fleets and facilities of the departments and agencies of the federal government through implementation of best practices and technological innovation and the use of tools of operation, control and monitoring (ieej.or.jp/aperc)	1999	EE	Deploy-demand	
PFAEE - Programme for Financing of Electric Energy Saving	Programme finances substitution of old refrigerators and air conditions, provides financial support for insulation and efficient lighting. Program started in 2002 through FIDE and CFE and is extended for the 2007-2012 period.	2002	EE	Deploy-demand	
Programa de Incentivos y Desarrollo de Mercado	Economic incentives and financing schemes for energy efficient equipment and energy saving projects in industry (WRI; conae.gob.mx)	2006	EE	Deploy-supply	RM
Green Mortgage Programme	Coordinated by CONAE and the National Fund for Workers' Dwelling (INFONAVIT), which provides credits to workers for home acquisition that are energy efficient (IEA EE; REN21)	2007	EE	Deploy-demand	
Training Programme for Specialists in Electric Energy Savings	Coordinated by FIDE, CFE and universities to train specialists in electric energy savings (IEA EE)	2007	EE	Deploy-interm.	

Table 6. Overview and classification of ETIPs and ETILs in China.

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
National Energy Leading Group	leading and coordinating role to manage energy sector (Downs 2008; Bo 2010; Gao 2010)	2005-2009			
NEC - National Energy Commission	draft national energy development strategy and discuss energy security and development issues (Bo 2010; Gao 2010)	2010	GE		CoL
NAC - National Energy Administration	handles daily affairs, manages energy sector, draft energy policies, negotiate with international agencies and approves foreign direct investments (Bo 2010; Gao 2010)	2008	GE		CoL
CAS - Chinese Academy of Sciences	R&D funding; has developed Sustainable Development Strategy Study Group, which published sustainable development strategy report in 2009 (english.cas.cn)	1949	GE	R&D-demand	GoS
National Science Foundation	responsible for R&D funding for basic and applied science; affiliated to the state council (nsc.gov.cn)		GE	R&D-demand	GoS
CSEP - China's Sustainable Energy Program	sets up regional demonstration projects (efchina.org)	1999	RE	Demo-interm.	
Solar Energy Standardization Committee	Founded in 2008 to plan, develop and review national standards for the solar energy industry; two stat-level testing centers and two certifications centers have been established (REN21)	2008	RE	deploy-interm.	CoL
11 th Five-Year plan	Call for doubling renewable energy generation to 15% of country's needs by 2020; for PV it announced 250 MW for 2m household in remote areas, 50MW of rooftop and BIPV systems and a 20MW demonstration plan in Gobi desert (en.ndrc.gov.cn)	2005	RE	Deploy-support	CoL; GoS
China's National Climate Change Program	Strategic policy by MOST; it highlights actions for energy efficiency improvement, vehicles emission standards, participation in international R&D programs, development and utilization of hydropower and other renewable energy and the development and dissemination of CCS (IEA;Liu 2009)	2007-2010	GE		GoS
National Medium- and Long-term Science & Technology Development Plan by State Council	Designated "energy" as No. 1 area that "needs urgent S&T support"; Formally establishes CCS as leading-edge technology (Liu 2009)	2006-2020	FE	R&D-demand	
973 programme	funding of fundamental R&D to meet national strategic needs (973.gov.cn)	1997	GE	R&D-supply; R&D-demand	GoS; KDe
863 programme	funding of applied R&D to boost innovation capacity in the high-tech sectors (most.gov.cn)	1986	GE	R&D-supply; R&D-demand	GoS; KDe
Key Technology Programme	funding of technologies that address pressing major S&T issues in national economic and social development (most.gov.cn)	1982	GE	R&D-supply; R&D-demand	GoS; KDe
Torch programme	Program to develop high-tech products, to establish high-tech industrial development zones and explore management systems and operation mechanisms for hi-tech industrial development; includes materials sciences and energy-saving technologies (china.org.cn)	1988	GE	R&D-supply; R&D-demand	GoS; KDe
Spark programme	Aims to revitalize rural economy through scienc and technology through S&T demonstration projects (china.org.cn)	1986	GE	Demo-supply	RM; KDe
State Grid Corp. 'Smart Grid' plan	planning, including establishing technical standards and equipment research and development, and capital expenditure on its UHV projects, exceeding CNY200 bln by 2012 (reuters.com;nasdaq.com)	2010-2011	TDS	Deploy-supply	
State Grid Corp. 'Smart Grid' plan	planning, including establishing technical standards and equipment research and development, and capital expenditure on its UHV projects, exceeding CNY200 bln by 2012 (reuters.com;nasdaq.com)	2010-2012	TDS	Deploy-interm.	
National Energy Strategy	Targets to decrease reliance on coal, increase use of clean coal, tarrgets for hydroelectric, nuclear power, small scale hydro, wind and biomass-fired electricity, solar geothermal, ocean and tidal (WRI; IEA CC)	2005	GE		CoL
Medium- and Long-term Nuclear Power Development Plan	Set out by China's State Council, sets goal to increase capacity from 7 to 40 Gwe by 2020 (Zhou 2010)	2007	NE		CoL
Higher expectations for Nuclear Power Development	In March 2008, the NDRC suggested that installed nuclear power capacity might even exceed 60 Gwe by 2020 due to faster than expected construction (Zhou 2010)	2008	NE		CoL
11th Five-year renewable energy Plan	First Renewable Energy plan in China; introduced in March 2008 and sets a target of 10 GW for wind in 2010, although the target was already exceeded in 2008 (Liu 2010)	2008	RE		CoL
"Geologic Carbon Storage with Enhanced Oil Recovery"	R&D expenditure within the 973 program (Liu 2009;Chen 2010)	2006-2011	FE	R&D-supply	KDe
"Basic research on thermal-to-power conversion processes in gas turbines"	R&D expenditure within the 973 program (Chen 2010)		FE	R&D-supply	KDe

Table 6. Overview and classification of ETIPs and ETILs in China (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
"Basic research on polygeneration systems with syngas co-production from coal gas and coke	R&D expenditure within the 973 program (Chen 2010)		FE	R&D-supply	KDe
"Basic research on high efficiency catalytic reforming of natural gas	R&D expenditure within the 973 program (Chen 2010)		FE	R&D-supply	KDe
"Fuel Efficient and New Fuel Vehicle Project"	R&D expenditure under 863 (Xiao 2007)	2006-2011	EE	R&D-supply	KDe
"IGCC & Co-production"	R & D expenditure in 863 program of 11th five year plan; 350 mln CHY with	2006-2011	FE	R&D-supply;	KDe
"Carbon Capture and Storage"	R&D expenditure within 863 program (Liu 2009;Chen 2010)	2008-2010	FE	R&D-supply	KDe
"Carbon capture absorption"	R&D expenditure within 863 program (Chen 2010)		FE	R&D-supply	KDe
"Opposed multi-burner coal-water slurry gasifier"	Based on previously successful development of coal gasification; program aims to develop a 2000 t/d gasifier, which will possibly be used in the IGCC demonstration power plant station in Banshan (Liu and	2006-2011	FE	Demo-supply; Demo-demand	
"Two-staged dry feed pressurized coal gasifier"	863 program that funds demonstration project for 2000 t/d gasifier by Xi'an Thermal Power Research Institute (TPRI), which is the technology center of SOE CHNG (Liu and Gallagher, 2010)		FE	Demo-supply; Demo-demand	
"Basic Research on High-Efficiency Catalytic Conversion of Natural Gas and Syn-Gas"	973 program launched by MOST (Yuan and Lin 2010)	2005-2009	TDS	R&D-supply	KDe
"Key Program for Novel H2 Production and High Temperature	863 program initiated by MOST (Yuan and Lin 2010)	2007-2010	TDS	R&D-supply	KDe
"Annual Thematic Project for H2 and FC"	863 program initiated by MOST (Yuan and Lin 2010)	2007-2010	TDS	R&D-supply	KDe
Deployment of supercritical and ultra-supercritical power plants	First application of supercritical boilers was in 1992 (imported from Switzerland and the USA); domestically made ultra-supercritical boilers are commercially operated in the SOE Huaneng Groups' Yuhuan power plant and the Zouxian power plant (Chen 2010)	1992	FE	Deploy-supply	
demonstration plants for coal liquefaction	Demonstration projects by Shenhua Group Cooperation and Yitai BIHI-TECH Co. have been running since 2004, Yankuang Group, Lu'an Minig Group and others are building demonstration projects (Chen 2010)	2004	FE	Demo-supply; Demo-demand	
Test-bed slurry feed coal gasifier	The technology was developed by Huadong Science and Technology university, but Xi'an Thermal Power Research institute has developed and is operating an intermediate test facility (Chen 2010)	2005	FE	Demo-supply	
Technology transfer of circulating fluidized bed power plants	First commercial boiler in operation in 2006; several other CFB units are in operation at the China Huaneng Group's Kaiyuan power plant, the China Datang Group's Honghe power plant and China Huadian Group's Xunjiansi power plant (Chen 2010)	2006	FE	Deploy-supply	
GreenGen project	Demonstration project by Huaneng Group to build a near-zero carbon-emission IGCC power plant in China; received approval by NDRC in May 2009 (Chen 2010; Liu and Gallagher 2010)	2006	FE	Demo-supply; Demo-demand	
demonstration plant for coal gasification-based poly-generation system	Developed in 2006 (1.58 bln RMB) by SOE Yankuang company with innovation from CAS; funded by the 863 program (Chen 2010; Liu and Gallagher 2010)	2006	FE	Demo-supply; Demo-demand	
deployment of IGCC power plants	China Huadian Corporation (a SOE) will build a 200 MW IGCC power plant and will retrofit another plant to use IGCC in Gongguan (Chen 2010)	2006	FE	Deploy-supply	
CO2 storage and usage demonstration	project by PetroChina (a SOE) for a CO2 storage and usage project at the Jilin Oil Field since 2006 to develop key technologies (Chen 2010)	2006	FE	Demo-supply; Demo-demand	
Coal-to-Liquid agreement	MoU between Shenhua Corporation and Sasol and Ningxia Coal Ltd. and Sasol to do feasibility studies for two plants delivering 80,000 bdp of liquid fuels based on Sasol's low-temperature Fischer-Tropsch technology (IEA CCC)	2006-2012	FE	Demo-supply; Demo-interm.; Demo-demand	
Coal-to-Chemicals plant	Joint venture with Shandong Hai Hua Coal and Chemical Company with Synthesis Energy Systems; commercial production of chemicals based on U-gas technology licenced from the Gas Technology Institute (IEA CCC)	2009	FE	Deploy-supply; Deploy-interm.; Deploy-demand	

Table 6. Overview and classification of ETIPs and ETIs in China (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
CO2 storage demonstration on 330 MW power unit	MoU between EESTech and Dagang power of China to develop demonstration projects for CCS based on EESTech's carbon management and storage technology (IEA CCC)	2009	FE	Deploy-supply; Deploy-interm.; Deploy-demand	
Standards for supercritical and ultra-supercritical power plants	Between 2010 and 2020, all new power plants > 600 MW have to be supercritical and about half of the newly built power generating units will be ultra-supercritical (Chen 2010)	2009	FE	Deploy-demand	MF
Baima CFB Demonstration Power Plant	Demonstration project of large scale CFB demonstration plant (shareholders of the project are the State Power Grid and Sichuan Bashu Electric Power Development Company) (Chen 2010)	2009	FE	Demo-supply; Demo-demand	
Post-combustion carbon capture facility pilot project	project by China Huaneng Group (a SOE) to capture and recover more than 85% of the CO2 in power plant flue gasses (Chen 2010)	2008	FE	Demo-supply; Demo-demand	
A Notice of Implementation on Coal Mine Methane to Power Generation	Published by NDRC in April 2007 to promote implementation of this technology (Yang 2009)	2007	FE	Deploy-demand	
A Notice on Subsidies to Coal Mine Methane Capture and Utilization	Published by Minsitry of Finance in China in 2007 (Yang 2009)	2007	FE	Deploy-supply	
Coal Mine Methane Emissions Standards	Published by the Ministry of Envrioment of China and the national Quality Monitoring and Quarantine agency in 2008 (Yang 2009)	2008	FE	Deploy-demand	MF
Land Use Priority CCM	the national "Land Transfer Policy" gives priority to projects with Coal Mine Methane recovery and utilization (Yang 2009)		FE	Deploy-supply	
Gas pipeline priority CCM	Coal mine methane reaching required quality standards has priority to be pumped into city gas pipelines (Yang 2009)		FE	Deploy-supply	
Electricity supply priority CCM	Electricity produced from coal mine methane has priority when selling into the grid (Yang 2009)		FE	Deploy-supply	
Feed-in subsidies for CCM electricity	The government subsidizes each kilowatt of surplus coal mine methane electricity (Yang 2009)		FE	Deploy-supply	
Value Added Tax Returns CCM	Value added tax levied from coal mines developing coal mine methane technologies to recover and utilize CCM will be returned (Yang 2009)		FE	Deploy-supply	
Accelerated capital depreciation CCM	Purchases and installment of coal mine methane recovery and utilization equipment is allowed accelerated deprectiation (Yang 2009)		FE	Deploy-supply	
tax offsets CCM investments	Tax offsets for capital investments into CCM projects financed via self equity or loans (Yang 2009)		FE	Deploy-supply	
tax offsets R&D in CCM	Companies with R&D investments are allowed 100% offset of investment value from taxable income (Yang 2009)		FE	R&D-supply	KDe
Import duty exemptions CCM equipment	Import duty and import-related tax and value-added tax will be exempt from coal mine methane utilization equipment (Yang 2009)		FE	Deploy-supply	
COACH - Cooperation Action within the CCS China-EU project	international project with 12 European and 8 Chinese partner to investigate the storage potential of the Bohai basin (Chen 2010)	2006	FE	R&D-interm.	KDi
NZEC - Near Zero Emissions Coal Initiative	Sino-UK project with 20 Chinese partners to explore storage potential and emission source assessments (Chen 2010)	2007	FE	R&D-interm.	KDi
Carbon Dioxide Captuer and Hydrogen Production from Gaseous Fuels project	International cooperation project with the EU (Chen 2010)	2006-2009	FE	R&D-interm.	KDi
STRACO2 - Support to Regulatory Activities for Carbon Capture and Storage	International cooperation project with the EU on regulation (Chen 2010)	2008-2009	FE	Deploy-interm.	KDi
CO2 capture Using Amine process	International cooperation and exchange with the EU (Chen 2010)	2008-2010	FE	R&D-interm.	KDi
CAGS - China Australia Geological Storage	International cooperation and exchange with Australia (Chen 2010)	2008-2010	FE	R&D-interm.	KDi
HFETR - Operational High-Flux engineering Test Reactor	Run by Leshan Nuclear Power Institute of China, it was build in 1979 but converted in 2007 to use low-enriched uranium (WNA)	1979	NE	R&D-supply	KDe
CEFR - 65 MW China Experimental Fast Reactor	Launched in 1993 at CIAE and with help of Russian technology in 2000, the construction has finally started in 2011 (WNA)	1993	NE	R&D-supply; R&D-interm.	KDE;KDi
Commissioning of 4 generation III+ AP 1000 reactors	State Council approved plans for pioneering Generation III nuclear technology from overseas in the Sanmen and Yangjiang; the State Nuclear Power Technology Corpration (SNPTC) choose Westinghouse AP 1000 reactor designs in 2007 (WNA)	2004	NE	Deploy-supply	CoL
Deployment of Candu-6 reactors	Technology development agreement between CNNC and Atomic Energy of Canada (AECL) to build new reactors; since the technology is well understood, it is not classified as 'innovative'	2005	NE		
China-South Africa R&D agreement on HTR concept	Agreement (renewed in 2009) between PBMR Pty Ltd (South Africa), Chinerp Co. and INET to cooperate on demonstration and commercialisation of HTR concept (WNA)	2005	NE	R&D-interm.	KDi
HTR and large size advanced PWR top priorities	State Council issued 'large szie advanced PWR' and 'High-temperature gas cooled reactor' as two of the 16 special S&T projects within the 'national medium- and long-term program for science and technology development 2006-2020' (WNA)	2006	NE		GoS

Table 6. Overview and classification of ETIPs and ETIs in China (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Demonstration of small high-temperature gas-cooled (HTR) reactor	Announced by State Council in 2006, CINA Huangeng Group lead a consortium to build a 210 MWe demonstration HTR-reactor (WNA)	2006	NE	Demo-supply; Demo-demand	
Commissioning of 2 EPR power stations	Agreement between EDF and CGNPC to build two-unit EPR power stations; contracted as joint venture with 70% ownership by CGNPC; commissioning started in 2009 (WNA)	2007	NE	Deploy-supply	
Ultra High Voltage Network	The State Grid Corporation is rapidly developing ultra high voltage lines; adding 300 GW in capacity by 2020; total investment of \$600 bln (WNA)	2008	TDS	Deploy-supply	
Expansion of nuclear capacity	CNNC has plans to expand nuclear capacity to 80 GW by 2020, 200 GW by 2030 and 400 GW by 2050 with an estimated CNY 800 Bln in investments until 2020 (WNA)	2008	NE		CoL
PWR technology transfer	joint venture by CGNPC (55%) and Areva to transfer PWR and EPR technology to other plants in China (WNA)	2008	NE	Deploy-interm.	
Deployment of indigenously developed CPR-1000	Indigenous technology developed by CGNPC in cooperation with AVERA and deployed domestically in nuclear power stations (WNA)	2008	NE	Deploy-supply	
CARR - 60 MW China Advanced Research Reactor	Operational research reactor build by China Institute of Atomic Energy (CIAE); announced in 2008 and currently under construction	2008	NE	R&D-supply	KDe
State Research Centre for Nuclear Power Technology	Cooperation between SNPTC and Tsinghua University, the institute focuses on large-scale advanced PWR technology (WNA)	2008	NE	R&D-supply	KDe
Advanced fuel cycle technologies	Agreement with NPIC, AECL (Canada), Third Qinshan Nuclear Power Company (TQNPC) and China North Nuclear Fuel Corporation to develop technologies for recycling used nuclear fuel from other Chinese PWR reactors (WNA)	2008	NE	R&D-supply; R&D-interm.	KDe;KDi
Design and demonstration of large nuclear reactor based on AP 1000 design	Joint venture by SNPTC and SNERDI, called Sate Nuclear Demonstration Company, to build and operate initial unit of CAP1400, construction to be started in 2013 and operation in 2017 (WNA)	2009	NE	Demo-supply; Demo-demand	
Demonstration of fast neutron reactor	Development of indigenous FNR through 65 MW demonstration plant; however in 2009 it was decided to use the Russian BN-800 technology instead of an indigenous design (WNA)	2009	NE	Demo-supply; Demo-interm.; Demo-demand	
Program on New and Renewable Energy Development in China (1996-2010)	Targets for fuel wood plantation, biogas supply, small hydro, solar, wind and tidal; provides tax incentives and low interest loans (WRI;newenergy.org.cn; Chang, Leung et al. 2003)	1996	RE	Deploy-supply	MF
Ride the Wind Program (or Chengfeng program)	program to develop domestic wind energy technology through building joint-ventures with foreign partners transferring wind energy technology in return for preferential treatment in the Chinese market (WRI;newenergy.org.cn;Tan 2010)	1996	RE	Deploy-supply	Kde; MF
Parallel Operation Regulations of Wind Power Generation	Legislation to allow interconnection, parallel operation and recovery of production costs for wind farms (WRI)	1996	RE	Deploy-interm.	
Brightness Program	Umbrella program, which includes the Township Electrification Program (TEP) and the Village Electrification Program. It includes multilateral and biolateral assistance to install solar and wind power systems in NorthWest china; overall target is 100w/person for 23 m people in remote areas (WRI;newenergy.org.cn;IEA RE)	1996	RE	Deploy-supply; Deploy-interm.	
Sunlight program	Upgrade of country's PV manufacturing capacity, large scale demonstration projects and home-PV systems for rural areas (WRI;newenergy.org.cn)	2002	RE	Demo-supply; Deploy-supply	MF
Cleaner production promotion law	Requirements for cleaner production, tax incentives and support for R&D and demonstration programs for awareness and information dissemination (WRI)	2002	EE	Deploy-support	Kdi
Support for Fuel Ethanol Production	Tax exemptions and grants for fuel ethanol producers; initially focused on grain but since 2008 also focuses on yam, sweet potato and cassava (IEA RE)	2002	RE	Deploy-supply	
Wind Power Concession programme	Feed-in tariffs, and wind concessions for 25 years with 10-15 years of guaranteed prices; domestic companies can bid for large-scale projects and a feed-in tariff, but their projects require domestic build wind turbines; this restriction has been removed in 2010 (IEA RE)	2003	RE	Deploy-supply; Deploy-interm.	MF
Preferential Tax Policies for Renewable Energy	Enforced in 2003 and extended in 2007, it provides reduced income tax rates for renewable energy enterprises and foreign investments into biogas and wind energy production (WRI;IEA RE)	2003	RE	Deploy-supply	RM
Import duties	Low import duties for renewable energy technologies; 3% for wind power plants, 6% for turbines and 21% for PV systems in comparison to 23% on average (WRI)		RE	Deploy-supply	MF
Measures on the Operation and Management of CDM Projects	Issued by NDRC, MOST, MFA and MOF to promote the development of CDM and approve renewable energy projects (REN21 2009)	2005	RE	Deploy-support	RM

Table 6. Overview and classification of ETIPs and ETILs in China (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Renewable energy law	The law is a framework policy, which establishes the responsibility of the State Council for overall implementation, management and utilization of renewable energy. It also establishes a range of measures (discount lending, tax preferences, portfolio standards, education, standardization), which have subsequently been worked out in other "notices", "interim measures" and "opinions" (IEA RE;WRI;REN21 2009)	2006	RE		CoL
Interim Management Measures for Renewable Power Tariff and Cost Allocation	Issued by NDRC in 2006 providing a fixed mechanism for feed-in tariffs that provide a reasonable price to assure wind industry development (REN21 2009; Liu 2010)	2006	RE	Deploy-supply	MF
Medium and Long-Term Energy Development Plan outline	Issued by NDRC, it provides renewable power generation targets of 10% in 2010, 12% in 2020 and 17% of overall energy consumption (IEA RE; en.ndrc.gov.cn)	2007	RE		CoL
Medium and Long-term Plan for Renewable Energy	Issued by NDRC in 2007 with requirements for minimum renewable power generation of 1% in 2010 and 3% in 2020 and also requirements for power companies to have 3% in 2010 and 8% in 2020 of their installed capacity to be renewable (REN21 2009)	2007	RE	Deploy-demand	
Energy Saving Power Generation Deployment Method (trial)	Published by NDRC, State Environmental Protection Administration, SERC and Energy Office asking power utilities to prioritize renewable power supply (REN21 2009)	2007	RE	Deploy-interm.	
Interim Measures on Renewable Power surcharge Collection and Allocation	Issued by NDRC in 2007 introducing a surcharge that provides a premium to renewable energy process (REN21 2009)	2007	RE	Deploy-supply	MF
Interim Procedure for the Distribution of Renewable Energy Power Price Additional Income	Issued by NDRC in 2007 adding a surcharge to the power retail price to subsidize and share the excess expenses for purchasing renewable electricity (REN21 2009)	2007	RE	Deploy-supply	MF
Regulatory Measures on Off-take Purchase of Electricity from Renewable energy Sources by Grid Companies	regulation by the State Electricity Regulation Commission (SERC) that wind power has priority in dispatching to the power grid (REN21 2009; Liu 2010)	2007	RE	Deploy-interm.	
Interim Measures for the Administration of the Special Funds for the Industrialization of Wind Power Generation Equipment	Subsidy to any qualified enterprise for its first 50 wind power units by the standard of 600 yuan/kW (REN21 2009)	2008	RE	Deploy-supply	MF
Interim Management Measures on Special Fund for Wind Power Generation Equipment Industrialization	Issued by MOF in 2008, which extends special R&D funds for the development of new wind power equipment (REN21 2009)	2008	RE	R&D-supply	KDe
Measures for the administration of the subsidy funds for the utilization of straws for energy	Funds granted for enterprises that use standards for straw use (REN21)	2008	RE	Deploy-supply	MF
Notice on Adjustment of Import Tax Policies for High-Power Wind Turbine and Its Key Parts and Raw Materials	Issued by MOF in 2009 that provides tax incentives supporting localized production of wind equipment (REN21 2009)	2009	RE	Deploy-interm.	
Interim Measures for the Administration of the Subsidy Funds from Public Finance for the Application of PV Solar energy in Buildings	Promote use of PV applications in domestic buildings through a subsidy of 20 yuan/wp (REN21 2009)	2009	RE	Deploy-supply	MF
Interim measures for the Administration of the Financial Subsidy Funds to the "Golden Sun" exemplary projects; which is similar as the conditions in the 'golden sun demonstration program'	PV solar projects connected to the power grid can receive a subsidy of 50% of total investments, with 70% for PV projects in remote areas without power; Target is at least 500MW of solar farms; 20Mw per province (REN21 2009)	2009	RE	Deploy-supply	MF
Deployment of new 300 MW wind power project	project by State Grid to invest in 300 MW wind power project in Zhangbei County, Hebei province, although it contradicts policies to separate power generation and grid enterprises (Liu 2010)	2009	RE	Deploy-supply	
Sinovel R&D center for off-shore wind power technology	China's only state-level research center in advanced wind power technology and equipment; supported by both NDRC and National Energy Administration (Liu 2010)	2009	RE	R&D-supply; R&D-interm.	KDe
Opinion on Speeding UP BIPV Application (no. 128 Caijian 2009)	Publication by MOF that makes clear that China upholds solar roof plan and will use leverage effect of financial policy (REN21 2009)	2009	RE		CoL
Notice on Subsidizing BIPV Application (no. 129 Caijian 2009)	Proposes standardized subsidy of RMB20/Wp to promote domestic PV market in China (REN21 2009)	2009	RE	Deploy-supply	MF
Notice of Requirements on the Buildings of Large Scale Grid-connected PV Project	Issued by NDRC in 2007 to build > 5MW power station including feed-in tariffs (REN21 2009)	2008	RE	Deploy-demand	

Table 6. Overview and classification of ETIPs and ETIs in China (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
3-Self Program (self construction, self management, self consumption)	Low-interest loans and tax incentives for new and renewable energy projects, including policies to promote small hydropower (WRI; Tong 2009)	1960s	RE	Deploy-supply	MF
Electricity generates electricity policy	A 6% tax preference for SHP and profits are used to build new SHP; levy on electricity goes to 'SHP development foundation' for soft loans (WRI; Tong 2009)		RE	Deploy-supply	RM
Design standards	Mandatory building design standards for energy efficiency; including testing methods and mandatory requirements to reduce energy consumption with 50% in 1/3 of all new buildings and 65% for all buildings in 2020 (WRI; Zhou, Levine et al. 2010)	1996	EE	Deploy-demand	GoS
Energy Conservation Law	List of energy-intensive equipment that has to be taken out of service and specific technical goals for new technologies; the law was revised in 2008 to provide basic system requirements for energy conservation management (ieej.or.jp/aperc; Zhou, Levine et al. 2010)	1998	EE		CoL
Medium and Long Term Energy Conservation Plan	Launched in 2005 by NDRC, the plan reduces energy consumption by 20% in 2010 compared to 2005 by building hydro and railway lines; also includes implementation plans for the 2010-20 period; plan includes energy conservation standards, monitoring and technical services, and green lighting (IEA EE; Zhou, Levine et al. 2010)	2005	EE		CoL
Efficiency upgrade for appliance production and public lighting	Policy within NDRC's 11th year plan, which replaces incandescent lamps and electromagnetic ballasts, promotes high-efficiency lighting in public facilities and renovates production and assembly lines of high-efficiency electronic appliances (IEA EE)	2004	EE	Deploy-demand	
Top-1000 Enterprises Energy Conservation Action in China	Establishing top-1000 of enterprise leaders in energy efficiency; the program is lead by five government agencies, including NDRC, Environment and Resources, National Bureau of Statistics and the National Energy Leading Group. It also includes an information system and website (IEA EE; Zhou, Levine et al. 2010)	2006	EE	Deploy-interm.	CoL
Energy efficient products for government procurement	Developed by Ministry of Finance and NDRC, it contains a list of 'energy efficient products for government procurement' (IEA EE)	2006	EE	Deploy-demand	MF
Retirement of Inefficient Plants	Agreement between central government and provincial officials to retire small and inefficient plants to reduce emissions; applies to coal-fire and oil-fired plants, the cement sector and steel sector (IEA EE)	2007	EE	Deploy-interm.	CoL
Aluminium Industry Permitting Standards	Regulatory instrument that sets standards for energy efficiency in aluminium industry (IEA EE)	2007	EE	Deploy-demand	MFv
energy-efficient and water-saving equipment directory of corporate income tax concessions	Reduction in income tax for enterprises that purchase and use energy-efficient devices and equipment (ieej.or.jp/aperc; Zhou, Levine et al. 2010)	2008	EE	Deploy-demand	
End-Use Energy Efficiency Program (EUEEP)	Implemented by NDRC with support from UNDP and GEF; Promotes technological innovation, design codes, training materials and guidelines (undp.org.cn; esa.un.org)	2005	EE	Deploy-interm.; Deploy-supply	
Energy-efficiency retrofit for existing residential buildings	Interim administrative method by Ministry of Finance for incentive funds for heating metering and retrofit of existing residential buildings in China's norming heating area (Zhou, Levine et al. 2010)	2007	EE	Deploy-supply	
Energy Conservation regulations for state-funded institutions	Energy efficiency standards for government buildings, procurement policies for efficient products and vehicles (ieej.or.jp/aperc)	2008	EE	Deploy-demand	MF
Ordinance on Energy-Saving of Civil Buildings	energy consumption standards are mandated and governments are required to set aside funds for energy conservation improvements (REN21; ieej.or.jp/aperc)	2008	EE	Deploy-demand	
Energy Efficiency labelling management approach	Product labelling catalogue was issued, which covers refrigerators (2005), air conditioners (2005), washing machines (2007), lighting (2008), water heaters (2008) and cookers (2009); label is now used as a requirement for product EE in some government procurement programs (ieej.or.jp/aperc; Li 2006)	2005	EE	Deploy-demand	MF
Enhanced Efficiency monitoring and auditing; development of efficiency centers	Policy guideline in 11th year plan: Provincial and industrial centers liable under federal law to provide monitoring, auditing, develop services for design, financing, renovation, operation and management (WRI)	2006	EE		CoL
Reduced export tax high-energy-consuming products	Introduced by NDRC and Ministry of Finance; reduced export tax rebates for many low-value-added but high energy-consuming products (Zhou, Levine et al. 2010)	2006	EE	Deploy-demand	
Energy Conservation Basic Standards	Industry standards (eight standards have been introduced since 2006) for energy measurement, energy consumption calculation, economic operation (ieej.or.jp/aperc)	2006	EE	Deploy-interm.	
Tax incentive policy for high-energy-efficiency products	Tax incentive policy jointly issued by State Administration of Taxation (SAT) and NDRC (Li 2006; Zhou, Levine et al. 2010)	2007	EE	Deploy-supply	MF
Minimum Energy Performance Standards (MEPS)	46 efficiency standards, including 36 mandatory energy efficiency standards for high energy consuming products in the thermal power, steel, nonferrous metals, building materials and petrochemical industries (ieej.or.jp/aperc; Li 2006; Zhou, Levine et al. 2010)	2008	EE	Deploy-demand	MF

Table 6. Overview and classification of ETIPs and ETILs in China (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Law of the Highway	Fuel-based taxation system intended to save energy and promote automobile technology development (WRI)	1998	EE	deploy-demand	
Vehicle fuel economy standards	mandatory fuel consumption limits for three-wheeled vehicles, low-speed trucks, and light commercial vehicles (ieej.or.jp/aperc; IEA EE; Zhou, Levine et al. 2010)	2005	EE	Deploy-demand	MF
Government notice to encourage environmentally-friendly low-emissions cars	Demands for tax breaks, preferential oil-pricing policies, lower parking charges and no restrictions for small cars (WRI)	2006	EE	Deploy-support	CoL
Vehicle Excise Tax Rates	Issued by the Ministry of Finance; includes tax incentives proportionate to the engine size with tax exemptions for zero-emissions vehicles (WRI; IEA EE; Zhou, Levine et al. 2010)	2006	EE	Deploy-demand	
Australia-China Bilateral cooperation on climate change	Development of handbooks for technology transfer into China; commercial cooperation on coal bed methane technology and policy assessments (IEA CC; ccchina.gov.cn)	2003	FE	Deploy-interm.	KDi
Australia-China Bilateral cooperation on climate change	Development of handbooks for technology transfer into China; commercial cooperation on coal bed methane technology and policy assessments (IEA CC; ccchina.gov.cn)	2003	GE		KDi
Market Transformation Programme – Partnership with the UK	Harmonizing and converging product performance standards for appliances (WRI; IEA EE)	2006	EE	Deploy-interm.	Kdi; MF
U.S.-China Biomass MOU	Cooperation on scientific, technical and policy aspects of biofuels to create unified standards, share studies and exchange knowledge (IEA RE; ere.energy.gov)	2007	RE	R&D-interm.	Kdi

Table 7. Overview and classification of ETIPs and ETILs in South Africa.

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
Department of Science & Technology	Small R&D budget for 'energy resources' and 'energysupply' (dst.gov.za)		GE	R&D-supply	KDe
Innovation Fund	Provides funds for patent application, 'valley of death' and 'later stage research wher proof exists' (innovationfund.ac.za)	1999-2009	GE	R&D-supply	KDe
Technology Innovation Agency	Newly crated agency to fund innovative activities; will take over the activities of the innovation fund (innovationfund.ac.za)	2010	GE		
CEF - Central Energy Fund Act	Levy on fuel to provide fund for research and promotion of appropriate energy solutions in the areas of oil, gas electrical power, solar energy, low-smoke fuels, biomass, wind and renewables (cef.org.za;WRI)	1994	RE	R&D-support; Demo-interm.	EA; RM; KDe
EDC - Energy Development Corporation	Organization established as part of the Central Energy Fund (CEF), which acts as a long-term equity investor in alternative energy fields (cef.org.za;IEA RE)	2004	RE	Deploy-interm.	RM
SANERI - South Africa's National Energy Research Institute	government institute on energy R&D funding and coordinating energy R&D (saneri.org.za)	2005-2009	GE	R&D-support	KDe
SANEDI - South Africa's National Energy Development Institute	mandate is to develop renewable energy resources, support energy efficiency programs, carry out research on energy technologies and energy supply security and develop and coordinate necessary energy infrastructure (saneri.org.za)	2010	GE		
RECORD - Renewable Energy Research and Demonstration Center	Research and demonstration centre (CORD) on renewable energy technologies and managed by SANEDI (SANERI 2008)	2009	RE	R&D-supply; R&D-interm.; Demo-interm.	KDe; KDi; EA
SACCCS - South Africa's Centre for Carbon Capture and Storage	Research and demonstration centre (CORD) on carbon capture and storage and managed by SANEDI (SANERI 2008)	2009	FE	R&D-supply; R&D-interm.; Demo-interm.	KDe; KDi; EA
CESAR - Centre for Energy Systems Analysis and Research	Research and demonstration centre (CORD) on energy systems analysis and managed by SANEDI (SANERI 2008)	2009	GE	R&D-supply; R&D-interm.; Demo-interm.	KDe; KDi; EA
Green Transport CORD	Research and demonstration centre (CORD) on green transport and managed by SANEDI (SANERI 2008)	2009	EE	R&D-supply; R&D-interm.; Demo-interm.	KDe; KDi; EA
NEEA - National Energy Efficiency Agency	Located within CEF, NEEA coordinates and oversees government-funded energy efficiency programs; prioritize projects, identify new strategies and cooperate to adopt best practices (cef.org.za)	2006	EE	R&D-support	GoS
NECSA - South Africa's Nuclear Energy Corporation	Besides responsible for nuclear energy R&D, NECSA has also a commercial group and is responsible for facility operation (necsa.co.za)	1999	NE	R&D-supply	KDe
REFSO - Renewable Energy Finance and Subsidy Office	Provides advice on finances, subsidies and procedures for RE projects, which includes information on size of awards, eligibility, procedural requirements and opportunities for accessing finance from other sources (Thabethe 2010)	2005	RE	Deploy-interm.	RM
SANTRECT - South African National Tradable Renewable Energy Certificate Team	Faciliates and coordinates the estblaishment of an issuing body of green certiciates, which also will be responsible for registering, issuing, transfer and redeem certificates in South Africa (Thabethe 2010)	2008	RE	Deploy-interm.	CoL
REPA - Renewable Energy Purchasing Agency	Eskom's 'single buyer office' is appointed as the REPA, the exclusive buyer of power under the REFIT program (thabethe 2010)	2010	RE		
Vision, strategic direction and framework for climate policy	Issued by DEAT providing measures to limite greenhouse gas emission s, develop the renewable energy sector and put in place more ambitious targets for renewable energy and promotes the transition to a low carbon economy (deat.gov.za; IEA RE)	2008	RE		CoL
White Paper on Renewable Energy Policy of 2003	Foster the uptake of renewable energy and set targets for renewable energy generation; provided six focal areas for actions: financial instruments, legal instruments;technology development, awareness raising; capacity building and education; marketb ased instruments and regulatory instruments (thabete 2010;IEA RE)	2003	RE		CoL
Integrated Energy Plan	Developed by DME, providing four senarios for South Africa's energy future; the document includes policy, legislation and regulation for promotion of RE, energy efficiency measures and mandatory provision of energy data (dme.gov.za;IEA RE)	2003			GoS
National Energy Act	Re-enacted in 2008; purpose is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices; provides for integrated energy planning, appropriate energy infrastructure and establishes institutions for energy research (thabethe 2010); Establishes National Energy Advisory Committee, a National Energy Database and Information System and requires integrated energy plans every five years (WRI)	2004	GE	Deploy-support	CoL

Table 7. Overview and classification of ETIPs and ETIs in South Africa (continued).

Policies & Institutions	Description	Start-End	Technology	Stage & Actor	Function
International Action Programme - Regulatory Framework for Renewable Energy	Regulatory framework to explore non-traditional funding mechanisms, feed-in tariffs, RE obligations and certification through study tours, work shops etc. (WRI;REN21)	2005	RE	Deploy-support	
International Action Programme – R&D on Renewable Energy	R&D funding provided by department of Science and Technology and reviewed by the Innovation Fund Renewable Energy R&D (WRI;REN21)	2005	RE	R&D-demand	Kde
Renewable Energy Subsidy Scheme	Coordinated by the Renewable Energy Finance Subsidy Office (REFSO), provides once-off capital grant of max. 20% for RE project developers (IEA RE;Thabethe 2010)	2005	RE	Deploy-supply	RM
Biofuel Industrial Strategy	Mandatory blending of 8% ethanol and 2% biodiesel and 2% biofuels in 5 years; biofuels average market penetreation of 4.5% in 2013 (Thabethe 2010)	2006	RE	Deploy-demand	MF
REMP - Renewable Energy Market Transformation Programme	Funded by World Bank and aims to remove and reduce the implementation costs of renewabl energy technologies through institutional and financial support(Thabethe 2010)	2008	RE	Deploy-interm.; Deploy-supply	MF
TREC - Tradable Renewable Energy Certification	Green certificate scheme to create renewe stream for renewable energy independent power producers (Thabethe 2010)	2008	RE	Deploy-interm.	
Solar Water Heating Programme	Rebates for households that install a solar water heating systems; the program is launced by Eskom and paid through a tariff lieved on consumer electricity bills (IEA RE)	2008	RE	Deploy-demand	
Solar Traffic Lights	Demonstration project converting all traffic and public lights into solar power with a battery backup; project will cost R400 mln and creates opportunities for employment and skill development (Thabethe 2010;WRI)	2008	GE	Demo-demand	
REFIT - Renewable Energy Feed-In Tariff	Feed-in tariffs for wind, small hydro, landfill gas, grid-connected PV systems, concentrated solar power, solid biomass and biogas. Purchase agreements will last for 20 years (IEA RE;nersa.org.za)	2009	RE	Deploy-supply	MF
SAEDES - South Africa Energy and Demand Efficiency Standard	Mandatory programme to increase energy efficiency in commercial buildings through design, innovation and use of renewable and development of energy labels (WRI;dme)	2004	EE	Deploy-demand	MF
Energy Efficiency Strategy	Published in 2005 by DME on the basis of the 1998 White Paper on Energy Policy; sets strategy for energy efficiency through guidelines for implementation, allows immediate implementationo of low-cost measures, acknowledges potentisl for energy efficiency and lays out Sectoral Implementation Plans (www.dme.gov.za/pdfs/energy/efficiency/ee_strategy_05.pdf)	2005	EE		CoL
Energy Efficiency Accord	Voluntary program signed by DME and industry to commit to energy efficiency targets; includes demand Side Management contracts, fiscal and other incentives, training material, identification of Best Practices and networking to increase energy efficiency with 15% in 2015 (IEA EE)	2005	EE	Deploy-demand	MF
Energy Efficient Motors Programme	Launced by Eskom providing subsidies to smooth out price difference between standard and high-efficiency motors. The program was placed on hold in 2009, but is expected to continue in 2010 (IEA EE;eskomdms.co.za)	2007	EE	Deploy-demand	RM
ECS - Energy Conservation Scheme	provides a baseline for all targeted customers (large users first) based on 06/07 and then develops energy saving targets for all customers; the program is executed by Eskom (ameu.co.za)	2008	EE	Deploy-demand	CoL
India-Brazil-South Africa Declaration on Clean Energy	Development, trade/investment, information exchange and cooperation to secure supply of safe, sustainable and non-polluting energy (IEA RE)	2003	GE	R&D-interm.; Deploy-interm.	KDI

2.2. Comparative frameworks for the BRIMCS countries

The overview in section 2.1. shows the classifications for each of the ETIP and ETII in force in 2009 in the BRIMCS countries. These classifications have been used to construct comparative frameworks for the BRIMCS countries. The comparative frameworks quantitatively provide an overview of the number of ETIPs or ETIs for each technology category and for each of the stages, actors or functions they support. In other words, the number in each category represents the total number of government interventions that affect that particular stage, actor, function and energy technology. Figure 1 provides an overview of each country for the classifications of stages & actors and Figure 2 provides an overview of each country for the classification of functions.

Brazil	R&D				Demonstration				Deployment			
	supply	interm.	demand	support	supply	interm.	demand	support	supply	interm.	demand	support
FE	1	1	1	0	1	0	0	0	1	1	0	0
NE	1	1	0	0	0	0	0	0	1	0	0	0
RE	2	1	0	0	1	0	0	0	10	3	4	4
EE	1	0	2	0	0	0	0	0	4	1	2	1
TDS	1	2	0	0	0	0	0	0	1	0	1	0
GE	0	2	4	0	0	0	0	0	0	3	1	2

Russia	R&D				Demonstration				Deployment			
	supply	interm.	demand	support	supply	interm.	demand	support	supply	interm.	demand	support
FE	0	0	0	0	0	0	0	0	1	0	0	0
NE	17	1	2	0	0	1	0	0	4	1	0	0
RE	1	1	1	0	0	0	0	0	4	4	1	1
EE	2	1	1	0	0	0	1	0	1	7	1	0
TDS	0	0	1	0	0	0	0	0	0	0	0	0
GE	1	0	1	0	0	0	0	0	0	0	0	1

India	R&D				Demonstration				Deployment			
	supply	interm.	demand	support	supply	interm.	demand	support	supply	interm.	demand	support
FE	8	4	0	0	3	0	2	0	5	1	2	1
NE	3	0	1	0	1	0	1	0	3	0	1	0
RE	8	0	0	0	4	0	1	0	13	6	3	1
EE	1	2	0	0	3	1	0	0	2	2	6	5
TDS	5	2	0	0	0	0	0	0	1	2	0	2
GE	0	1	1	0	0	0	0	0	0	1	1	0

Figure 1. Comparative frameworks on the basis of stages and actors for ETIPs and ETIIs in Brazil, Russia and India.

Mexico	R&D				Demonstration				Deployment			
	supply	interm.	demand	support	supply	interm.	demand	support	supply	interm.	demand	support
FE	3	0	0	0	0	0	0	0	0	1	0	0
NE	1	1	0	0	0	0	0	0	1	0	0	0
RE	2	1	0	0	0	1	1	0	6	6	2	0
EE	0	0	0	0	0	0	0	0	1	7	4	2
TDS	1	0	0	0	0	0	0	0	0	1	0	0
GE	0	0	0	0	0	0	0	0	0	0	0	0

China	R&D				Demonstration				Deployment			
	supply	interm.	demand	support	supply	interm.	demand	support	supply	interm.	demand	support
FE	8	5	1	0	11	3	10	0	13	4	4	0
NE	5	3	0	0	3	1	3	0	3	1	0	0
RE	2	2	0	0	1	1	0	0	20	7	2	2
EE	1	0	0	0	0	0	0	0	3	5	13	2
TDS	3	0	0	0	0	0	0	0	2	1	0	0
GE	4	0	6	0	1	0	0	0	0	0	0	0

South Africa	R&D				Demonstration				Deployment			
	supply	interm.	demand	support	supply	interm.	demand	support	supply	interm.	demand	support
FE	1	1	0	0	0	1	0	0	0	0	0	0
NE	1	0	0	0	0	0	0	0	0	0	0	0
RE	1	1	1	1	0	2	0	0	3	5	2	1
EE	1	1	0	1	0	1	0	0	0	0	4	0
TDS	0	0	0	0	0	0	0	0	0	0	0	0
GE	3	2	0	1	0	1	1	0	0	1	0	1

Figure 1. Comparative frameworks on the basis of stages and actors for ETIPs and ETILs in Mexico, China and South Africa (continued).

Brazil	knowledge creation	knowledge diffusion	resource allocation	entrepreneurial activities	guidance of search	creation of legitimacy	market formation
FE	2	0	1	0	0	0	1
NE	1	1	0	0	1	1	0
RE	2	2	3	2	0	3	13
EE	3	0	2	0	0	2	6
TDS	1	2	1	0	0	1	0
GE	1	2	1	0	2	2	2

Russia	knowledge creation	knowledge diffusion	resource allocation	entrepreneurial activities	guidance of search	creation of legitimacy	market formation
FE	0	0	0	0	0	1	0
NE	17	0	0	0	3	3	0
RE	2	1	1	1	3	5	4
EE	2	1	1	0	1	4	3
TDS	0	0	0	0	1	0	0
GE	0	0	0	0	0	0	0

India	knowledge creation	knowledge diffusion	resource allocation	entrepreneurial activities	guidance of search	creation of legitimacy	market formation
FE	10	1	1	1	0	0	0
NE	3	0	0	0	1	1	0
RE	8	2	5	1	2	2	7
EE	1	2	1	0	1	4	4
TDS	4	1	0	1	1	1	2
GE	0	1	0	0	1	1	0

Figure 2. Comparative frameworks on the basis of functions for ETIPs and ETILs in Brazil, Russia and India.

Mexico	knowledge creation	knowledge diffusion	resource allocation	entrepreneurial activities	guidance of search	creation of legitimacy	market formation
FE	3	1	0	0	0	1	0
NE	1	0	0	0	0	1	0
RE	2	1	0	0	2	4	8
EE	1	1	1	0	0	4	1
TDS	1	1	0	0	0	0	0
GE	0	0	1	0	2	2	0

China	knowledge creation	knowledge diffusion	resource allocation	entrepreneurial activities	guidance of search	creation of legitimacy	market formation
FE	8	7	0	0	0	0	2
NE	5	3	0	0	1	4	0
RE	3	1	3	0	1	6	14
EE	1	2	0	0	1	6	7
TDS	3	0	0	0	0	0	0
GE	5	1	1	0	7	3	0

South Africa	knowledge creation	knowledge diffusion	resource allocation	entrepreneurial activities	guidance of search	creation of legitimacy	market formation
FE	1	1	0	1	0	0	0
NE	1	0	0	0	0	0	0
RE	3	1	4	2	0	3	3
EE	1	1	1	1	1	2	2
TDS	0	0	0	0	0	0	0
GE	4	2	0	1	0	1	0

Figure 2. Comparative frameworks on the basis of functions for ETIPs and ETILs in Mexico, China and South Africa (continued).

References

- APERC (2008), "Understanding International Energy Initiatives in the APEC Region," Asia Pacific Energy Research Centre, 110, accessed at, http://www.ieej.or.jp/aperc/2008pdf/2008_Reports/APERC_2008_UIE12.pdf.
- Bo, Z. (2010), "China's New National Energy Commission: Policy Implications," National University of Singapore, accessed 08/10 at, <http://www.nus.edu.sg/NUSinfo/EAI/BB504.pdf>.
- Chang, J., D. Y. C. Leung, et al., (2003), "A review on the energy production, consumption, and prospect of renewable energy in China," *Renewable and Sustainable Energy Reviews*, 7(5): 453-468.
- Chen, W. and R. Xu, (2010), "Clean coal technology development in China," *Energy Policy*, 38(5): 2123-2130.
- de Carvalho, J. F. and I. L. Sauer, (2009), "Does Brazil need new nuclear power plants?," *Energy Policy*, 37(4): 1580-1584.
- Dino, R. and Y. L. Gallo, (2009), "CCS project in Recôncavo Basin," *Energy Procedia*, 1(1): 2005-2011.
- Gao, C., (2010), "Personal Communication," email correspondence with R. Kempener, 19 June 2010.
- Goldemberg, J., S. T. Coelho, et al., (2004), "How adequate policies can push renewables," *Energy Policy*, 32(9): 1141-1146.
- Hicks, J. C. R., (2010), "International Challenge for Promoting Green Innovation to Achieve A Low Carbon Society Worldwide," International Challenge for Promoting Green Innovation to Achieve A Low Carbon Society Worldwide, Tokyo, Japan, accessed 08/10 at, http://www.jst.go.jp/pr/img/gisympto2010/presentationFile_02.pdf.
- Hira, A. and L. G. de Oliveira, (2009), "No substitute for oil? How Brazil developed its ethanol industry," *Energy Policy*, 37(6): 2450-2456.
- Huacuz, J. M., (2005), "The road to green power in Mexico--reflections on the prospects for the large-scale and sustainable implementation of renewable energy," *Energy Policy*, 33(16): 2087-2099.
- Huacuz, J. M. and C. Medrano, (2007), "Mexico and Brazil: Renewable Energy Markets and Policies," Global Best Practice in Renewable Energy Policy Making, Experts Meeting, Paris, France, accessed 02/10 at, www.iea.org/work/2007/bestpractice/Huacuz.pdf.
- IEA, (2010a), "IEA Addressing Climate Change database," online database by IEA, accessed 09/10 at, <http://www.iea.org/textbase/pm/index.html>.
- IEA, (2010b), "IEA Clean Coal Projects Database," online database by IEA Clean Coal Center, accessed 08/10 at, <http://www.iea-coal.org.uk/site/ieacoal/databases/clean-coal-projects>.
- IEA, (2010c), "IEA Energy Efficiency Database," online database by IEA, accessed 09/10 at, <http://www.iea.org/textbase/pm/index.html>.
- IEA, (2010d), "IEA Global Renewable Energy database," online database by IEA, accessed 09/10 at, <http://www.iea.org/textbase/pm/index.html>.
- Joy, V. P., (2008), "Public Private Partnerships," A RoundTable by the Department of Economic Affairs; Ministry of Power, New Delhi, accessed 08/10 at, http://www.pppinindia.com/round-table-files/central/power_vp_joy_ppp_nov2008_kochi_meet.pdf.
- Kempener, R. and L. D. Anadon, (in preparation), "Energy Technology Innovation Policies in a Global Context: A Comparative Framework for Cooperation and Coordination," Belfer Working Paper.
- Klimenko, A., (2008), "Russian R&D Policy in the Field of Energy Technology," FASI-IEA NEET Workshop 'Cooperation in the field of energy technologies', Moscow, Russia.
- Leite, A. D., (2009), "Energy in Brazil: Towards a Renewable Energy Dominated System," London, Earthscan.
- Liu, H., (2009), "CCS in China: activities and considerations," Carbon Mitigation Initiative, 8th Year Meeting, Princeton, accessed 08/10 at, http://cmi.princeton.edu/news/pdfs/css_china.pdf.
- Liu, H. and K. S. Gallagher, (2010), "Catalyzing strategic transformation to a low-carbon economy: A CCS roadmap for China," *Energy Policy*, 38(1): 59-74.

- Makarov, A., (2009), "Scenarios of Russian Energy Future," *Geopolitics of Energy*, February 2009: 12-16.
- REN21 (2009), "Background Paper: Chinese Renewable Status Report," *Renewable Energy Policy Network for the 21st Century*, 95, accessed 08/10 at, http://www.ren21.net/pdf/Background_Paper_Chinese_Renewables_Status_Report_2009.pdf.
- REN21, (2010), "Renewables Interactive Map," online database by Renewable Energy Policy Network for the 21st Century, accessed 12/09 at, <http://www.ren21.net/map/>.
- Rodrigues, R. A. and J. H. Accarini (2009), "Brazil's Biodiesel Program," *MRE*, 23, accessed 08/10 at, <http://www.dc.mre.gov.br/imagens-e-textos/Biocombustiveis-09ing-programabrasileirobiodiesel.pdf>.
- SANERI (2008), "South African progress on RE Activities: From the perspective of the SA National Energy Research Institute," *SANERI*, 21, accessed 08/10 at, <http://www.ren21.net/presentations/SouthAfricanprogressonREActivities.pdf>.
- Santalo, J. M. G., (2009), "CCS in Mexico," North American Section of WEC, Calgary, Alberta, Canada, accessed 09/10 at, <http://www.energy.ca/users/getdownload.asp?DownloadID=423>.
- Shackley, S. and P. Verma, (2008), "Tackling CO2 reduction in India through use of CO2 capture and storage (CCS): Prospects and challenges," *Energy Policy*, 36(9): 3554-3561.
- Shmatko, S., (2009), "Report of the Minister of Energy on the draft Energy Strategy of Russia until 2030," Meeting of the Government of Russia, Moscow.
- Sousa Jr., P. T. d., (2005), "The Ethanol and Biodiesel Programmes in Brazil: A Brief Discussion," UNU Conference on Hydrogen Fuel Cells and Alternatives in the Transport Sector: Issues for Developing Countries, Maastricht, accessed 08/10 at, http://www.intech.unu.edu/events/workshops/hfc05/teixeira_ppt.pdf.
- Tan, X., (2010), "Clean technology R&D and innovation in emerging countries--Experience from China," *Energy Policy*, 38(6): 2916-2926.
- Thabethe, E., (2010), "Renewable Energy Policies in South Africa," World Future Council Workshop: Power Kick for Africa - Renewable Energy Policies for Sustainable African Development, Accra, Ghana, accessed 07/10 at, http://www.worldfuturecouncil.org/fileadmin/user_upload/PDF/PkFAE_Thabethe-Portfolio_Committee_on_Energy_RE_Policies_in_South_Africa.pdf.
- Tong, J., (2009), "Some Features of China's Small Hydropower," *Hydro Nepal*, 5(4): 11-14.
- World Nuclear Association, (2010), "Nuclear Power Country Briefings," online database by World Nuclear Association, accessed October 2010 at, <http://www.world-nuclear.org>.
- WRI, (2010), "SD-PAMs Database," online database by accessed December 2009 at, <http://projects.wri.org/sd-pams-database>.
- Yang, M., (2009), "Climate change and energy policies, coal and coalmine methane in China," *Energy Policy*, 37(8): 2858-2869.
- Yuan, K. and W. Lin, (2010), "Hydrogen in China: Policy, program and progress," *International Journal of Hydrogen Energy*, 35(7): 3110-3113.
- Zhou, N., M. D. Levine, et al., (2010), "Overview of current energy-efficiency policies in China," *Energy Policy*, In Press, Corrected Proof
- Zhou, Y., (2010), "Why is China going nuclear?," *Energy Policy*, 38(7): 3755-3762.