



## CARMEUSE NORTH AMERICA'S FLUE GAS CLEANING PATENTS

Category	Title	Country	Patent No. or Serial No.	Filing Date	Issue Date	Expiration Date
<b>Desulfurization of Flue Gases from Power Plants with Production of Valuable By-Products</b>						
	MAGNESIUM-ENHANCED SULFUR DIOXIDE SCRUBBING	U.S.	5,645,807	05/24/95	07/08/97	05/24/15
	WITH GYPSUM FORMATION	Canada	2,147,059	04/13/95	08/10/99	04/13/15
		Japan	102699/1995	4/26/95		
		Europe	0679426	04/18/95	09/17/97	04/18/15
		Korea	144369	04/27/95	04/17/98	04/27/15
		Mexico	195468	04/28/95	03/10/00	04/28/15
		Taiwan	095754	05/11/95	06/11/98	05/11/15
		China	59456	04/28/95	07/21/00	04/28/15
	FLUE GAS DESULFURIZATION WITH OXIDATION OF	U.S.	4,976,936	08/18/89	12/11/90	08/18/09
	CALCIUM SULFITE IN FGD DISCHARGES	Canada	2,023,434	08/16/90	06/23/98	08/16/10
		Europe	414,094	08/13/90	05/26/93	08/13/10
	PROCESS FOR DESULFURIZATION OF SULFUR DIOXIDE-CONTAINING	U.S.	5,039,499	04/29/88	08/13/91	08/13/08
	GAS STREAMS	Canada	1,309,840	04/27/89	11/10/92	11/10/09
		Europe	339,683	04/29/89	06/15/94	04/29/09
	SULFUR DIOXIDE REMOVAL PROCESS WITH GYPSUM AND	U.S.	5,084,255	03/26/91	01/28/92	03/26/11
	MAGNESIUM HYDROXIDE PRODUCTION	Canada	2,050,974	09/09/91	02/16/99	09/09/11
		Europe	505,607	08/14/91	11/08/95	08/14/11
		Poland	168240	03/26/92	03/25/95	03/25/12
	PROCESS FOR REMOVING SULFUR DIOXIDE FROM GASES AND	U.S.	5,614,158	10/20/95	03/25/97	10/20/15
	PRODUCING GYPSUM AND PURIFIED MAGNESIUM HYDROXIDE					



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Category	Title	Country	Patent No. or Serial No.	Filing Date	Issue Date	Expiration Date
<b>Desulfurization of Flue Gases from Power Plants with Improved Dewatering of Waste</b>						
	SULFUR DIOXIDE REMOVAL FROM FLUE GASES WITH SULFITE OXIDATION INHIBITION	U.S.	4,976,937	01/08/90	12/11/90	01/08/10
	SULFUR DIOXIDE REMOVAL FROM GASES USING A MODIFIED LIME (Method)	U.S. Canada Poland	5,082,639 2,050,944 169295	11/06/90 09/09/91 11/04/91	01/21/92 01/06/98 06/28/96	11/06/10 09/09/11 06/28/13
	SULFUR DIOXIDE REMOVAL FROM GASES USING A MODIFIED LIME (Composition)	U.S.	5,310,498	09/30/93	05/10/94	09/30/13
		Japan	2116290	08/19/92	12/06/96	08/19/12
	SODIUM-ENHANCED LIME SCRUBBING METHOD FOR REMOVING SULFUR DIOXIDE FROM GASEOUS STREAMS	U.S.	5,266,285	04/13/92	11/30/93	04/13/12
	PROCESS FOR DESULFURIZING A SULFUR DIOXIDE CONTAINING GAS	U.S. Europe	6,099,816 9730554.4	07/24/96 7/24/97	08/08/00	07/24/16
	MAGNESIUM-ENHANCED LIME SCRUBBING OF SULFUR DIOXIDE WITH THE PRODUCTION OF A HIGH SOLIDS CONTENT SLUDGE	U.S.	5,384,111	02/03/94	01/24/95	02/03/14



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Category	Title	Country	Patent No. or		Filing Date	Issue Date	Expiration Date
			Serial No.				
<b>Specialty By-Products from Flue Gas Desulfurization</b>							
	PROCESS FOR REMOVING SULFUR DIOXIDE FROM FLUE GASES	U.S.	4,996,032		12/21/89	02/26/91	12/21/09
		Canada	2,032,425		12/17/90	02/10/98	12/17/10
		Europe	434,019		12/19/90	08/03/94	12/19/10
	SULFUR DIOXIDE SCRUBBING PROCESS PRODUCING PURIFIED MAGNESIUM HYDROXIDE	U.S.	5,270,026		12/11/92	12/14/93	12/11/12
		Canada	2097670		06/03/93	07/06/99	06/03/13
		Europe	0601271		06/04/93	05/10/96	06/04/13
		Japan	3066403		11/19/93	05/19/00	11/19/13
		Turkey	27336		07/27/93	01/13/95	07/27/08
	AQUEOUS ALKALINE EARTH NITRATE FERTILIZER COMPOSITION AND PROCESS FOR MAKING THE SAME	China	97121798.X		12/23/97		
		Korea	0255020		11/03/97	02/09/00	11/03/17
		Taiwan	112568		10/30/97	07/03/00	10/30/17
		India	3026/MAS/97		12/30/97		
	METHOD FOR REMOVING NOX FROM A GAS STREAM WHILE PRODUCING AN ALKALINE EARTH NITRATE FERTILIZER COMPOSITION	U.S.	5,846,286		03/07/97	12/08/98	03/07/17
	PROCESS FOR PRODUCING MAGNESIUM SULFITE HEXAHYDRATE IN A FLUE GAS DESULFURIZATION SYSTEM	Canada	2,133,694		10/05/94	04/28/98	10/05/14
	METHOD OF COLLECTING AND CONDITIONING A PETROLEUM COKE FLUID BED COMBUSTION ASH	U.S.	5,481,989		08/23/94	01/09/96	08/23/14
	METHOD OF AMELIORATING ACID SOIL TO ENHANCE PLANT GROWTH	U.S.	5,628,811		08/23/94	05/13/97	08/23/14
		Canada	2,156,680		08/22/95	02/23/99	08/22/15
	SULFUR DIOXIDE SCRUBBING WITH PRODUCTION OF PURE MAGNESIUM SULFITE PRODUCT	China	64582		07/18/96	10/21/00	07/18/16
		India	1086/MAS.96		6/20/96		



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<b>Specialty By-Products from Flue Gas Desulfurization (continued)</b>						
	HIGH-PURITY MAGNESIUM HYDROXIDE AND PROCESS FOR ITS PRODUCTION	U.S. China EPO	6,214,313 105,768 108,180	04/13/99 4/6/00 4/13/00	04/10/01	04/13/19
	PROCESS FOR PRODUCING CEMENT FROM A FLUE GAS DESULFURIZATION PROCESS WASTE PRODUCT	U.S.	5,766,339	5/7/97	6/16/98	5/7/17
	PROCESS FOR PRODUCING CEMENT AND ELEMENTAL SULFUR FROM A FLUE GAS DESULFURIZATION WASTE PRODUCT	U.S.	5,769,940	7/28/97	6/23/98	7/28/17
<b>Multi-Pollutant Control (sulfur dioxide and nitrogen oxides)</b>						
	PROCESS FOR REMOVING SULFUR DIOXIDE AND NITROGEN OXIDES FROM FLUE GASES	U.S. Canada	5,200,160 2072161	08/29/91 06/23/92	04/06/93 03/16/99	08/29/11 06/23/12
	PROCESS FOR REMOVING SO <sub>2</sub> AND NO <sub>x</sub> FROM A GASEOUS STREAM	U.S. Korea China India	5,827,488 0225473 97115291.8 2441/MAS/97	09/06/96 08/27/97 9/1/97 10/27/97	10/27/98 07/20/99	09/06/16 08/27/17
	METHOD FOR REMOVING SULFUR DIOXIDE AND NITROGEN OXIDES FROM COMBUSTION GASES	U.S. Korea Thailand China India	5,817,283 0225474 38741 97119140.9 2295/MAS/97	10/15/96 08/27/97 7/25/97 10/14/97 10/15/97	10/06/98 07/20/99	09/06/16 08/27/17
	METHOD OF REMOVING SULFUR DIOXIDE AND NITROGEN OXIDES FROM A GASEOUS STREAM	U.S.	5,785,841	04/19/96	07/28/98	04/19/16



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<b>Multi-Pollutant Control (sulfur dioxide and nitrogen oxides) continued</b>						
	PROCESS FOR REMOVING SULFUR DIOXIDE AND NITROGEN OXIDES FROM A HOT GASEOUS STREAM WITH FERROUS CHELATE REGENERATION	U.S.	5,695,727	03/05/96	12/9/97	03/05/16
	METHOD FOR THE REMOVAL OF SULFUR DIOXIDE AND NITROGEN OXIDES FROM A GASEOUS STREAM	U.S.	5,683,666	01/19/96	11/04/97	01/19/16
<b>Flue Gas Desulfurization Process Improvements</b>						
	REDUCTION OF CALCIUM AND CHLORINE IN THE FLUE GAS DESULFURIZATION PROCESS	Canada	2,323,337	10/17/00		
	SULFUR DIOXIDE REMOVAL PROCESS WITH REGENERATION SCALE PREVENTION	U.S. Europe	576,589 123061.4	5/22/00 10/24/00		
<b>Highly Reactive Lime for Dry Flue Gas Desulfurization</b>						
	REMOVAL OF SO <sub>2</sub> FROM SO <sub>2</sub> - CONTAINING GASES	U.S.	4,626,418	09/26/85	12/02/86	09/26/05
<b>Lime Preparation and Flue Gas Desulfurization Process Equipment</b>						
	COMPACT LIME SLAKER	U.S.	5,294,408	04/16/93	03/15/94	04/16/13
	COMPACT LIME SLAKER AND METHOD OF SLAKING LIME	U.S.	5,336,481	12/02/93	08/09/94	12/02/13
	LIME SLAKER	U.S.	4,779,992	06/03/87	10/25/88	06/03/07
	METHOD OF REMOVING SULFUR DIOXIDE FROM A GASEOUS STREAM IN A WET SCRUBBING UNIT	U.S.	09/817939	3/27/01		
	COORDINATION OF LIQUID-SOLID SEPARATORS AND FLUID TANKS	U.S.	6,033,577	05/18/98	03/07/00	05/18/18



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<b>Lime Preparation and Flue Gas Desulfurization Process Equipment (continued)</b>						
	METHOD AND APPARATUS FOR SEPARATING FAST SETTLING PARTICLES FROM SLOW SETTLING PARTICLES	U.S.	6,250.47	11/17/98	6/26/01	11/17/18
	HORIZONTAL WET SCRUBBING APPARATUS AND METHOD FOR REMOVING SULFUR DIOXIDE FROM GASEOUS STREAMS	U.S.	5,403,568	03/05/93	04/04/95	03/05/13
		Mexico	187940	02/17/94	02/02/98	02/17/14
		Poland	176,512	03/04/94	10/29/98	03/04/14
		Turkey	28576	04/13/94	11/04/96	04/13/14
		Korea	246,597	03/05/94	12/07/99	12/07/19
	ELECTROCHEMICAL PROCESS	U.S.	5,705,051	4/15/96	1/6/98	4/15/16