

Table 1: Technology Overview – Summary Technical Details

Technology Provider	Technology	Scale+	Comp. treated	Related comp treated	Validation project experience**	Applicability Ranking++	Additional Remarks	Others
Kinectrics Inc.	Sodium Reduction	F	Contaminated oil from 50 ppm to pure PCB liquid	Contaminated oil and pure PCB liquid	Since 19985	DA	Commercial operation for low level since 1985, for pure PCBs since 1995. Toyota City plant in Japan is using this process for destruction of pure PCBs since 2005	
Sanexen Environmental Services Inc., Canada	Alkali-Metal-Reduction	F	PCB in various contaminated materials, mostly from electrical supply equipments	PCBs	Over 25 years of experience	DA	Commercial operation of PCB's since 1985. Cleaned 25 000 metric tonnes by means of DCR mobile systems	
Powertech Labs Inc., Canada	Sodium Reduction	F	PCB in oil, PCB in fluorescent ballast waste	PCBs	Since 1987	DA	Liquid plant treats 2400 m3/y and formerly a plant for solids is closed now that treated 7000 t/y.	
TREDI - Groupe Séché, France	De-halogenation and regeneration of mineral oil contaminated with chlorine and sulphur compounds (Sodium Hydride)	F	PCB-contaminated oils containing concentrations up to 20,000 ppm and for Askarel transformers (>10,000 mg/kg of PCBs)	PCB's	Since 1995	DA	Since 1995 around 1500 tons have been treated.	
+Key: F - Full-scale applications completed					++Key: Applicability ranking for pesticides			
P - Pilot/Demonstration scale completed; no F-applications					DA – Direct applicable			
B - Bench/Laboratory scale completed; no P or F-applications					FS 1 – Full scale within reasonable period possible 0-2 years			
T - Theoretical applicable, no B, P, F applications					FS 2 – Full scale within considerable period possible 2-5 years			
* Vendor claims performance of demonstration, but no data provided					**Validation on the basis of info provided in Table 2 and 3			

Table 2: Overview Project Experience per Technology Supplier

Technology Provider	Contaminants	Amount treated in tons	Results incl. DRE, Pre-treat, Post treat Emissions, energy consumption, costs*	Client References Name, address, contact person phone, Email, fax
Kinectrics	PCB contaminated mineral oil	Over 8 million litres	Residual level less than MDL by HRMS (less than 20 ppb per congener)	Commercial plant in Ontario, Canada; Toyota City, Japan; KD Oil Refinery South Korea. Plant under construction in Slovakia (UNIDO Project)
Kinectrics	Pure PCB liquid	Over 300,000 kg of pure PCBs	Residual level less than MDL by HRMS (less than 20 ppb per congener). Demonstrated greater than 99.9999% DE	Toyota City PCB Destruction Plant
Kinectrics	Pure PCB liquid	Over 2000 kg	Residual level less than MDL by HRMS (less than 20 ppb per congener). Demonstrated greater than 99.9999% DE	Demonstration projects in Canada and Mexico
Powertech Labs Inc	PCB contaminated transformer oil	~15 000 t (Since 1987)	Residual < 2 ppm	Commercial plant operated since 1987 at BC Hydro Power Oil Business Unit plants, Canada)
Sanexen - Canada	PCB materials consist. of oil, Askarel, and electrical equipment	25 000 metric tonnes	DE varies typically between 99% and 99.9% in most applications	Hydro-Québec's "Bout-de-l'Île" site in Montréal, 1985-2000
TREDI – Séché	PCB's	Dielectric mass 16 000 kg	98.7 % on PCB	ENEL SPA, Bucine (AR), Italy, 1999
TREDI – Séché	PCB's	22 600 kg	98.5 % on PCB	ENEL SPA, Parma, Italy, 1999
TREDI – Séché	PCB's	17 500 kg	98.9 % on PCB	ENEL SPA, Figlina Valdarno (FI), 2001
TREDI – Séché	PCB's	15 600 kg	99.6 % on PCB	ENEL SPA, Folano della Chiana (AR), 2001
TREDI – Séché	PCB's	15 000 kg	99.3 % on PCB	ENEL SPA, Bossano (VI), 2002
TREDI – Séché	PCB's	13 000 kg	97.7 % on PCB	Celestica Italia SPA, Viomercato (MI), 2002

Table 3: Overview detailed project information per project – Project name (from Table 2):

Location project	Pre-treat mg/kg	Post-treat mg/kg	DREs	Emissions 1. Air (HCl, Dioxins & furans etc) 2. Water, 3. Waste (slags)	Energy consumption	Costs(Capital, operating costs)	Others, remarks
ENEL SPA, Bucine (AR)	315 ppm of PCB	4 ppm of PCB Transformer ready for re - use	98.7 % on PCB	1900 kg slags	8000 kWh electricity		
ENEL SPA, Parma	330 ppm of PCB	5 ppm of PCB Transformer ready for re – use	98.5 % on PCB	2700 kg slags	11200 kWh electricity		
ENEL SPA, Figlina Valdarno (FI)	190 ppm of PCB	2 ppm of PCB Transformer ready for re – use	98.9 % on PCB	2100 kg slags	8700 kWh electricity		
ENEL SPA, Folano della Chiana (AR)	285 ppm of PCB	1 ppm of PCB Transformer ready for re – use	99.6 % on PCB	1900 kg slags	7800 kWh electricity		
ENEL SPA Bossano (VI)	450 ppm of PCB	3 ppm of PCB Transformer ready for re – use	99.3 % on PCB	1800 kg slags	7500 kWh electricity		
Celestica Italia SPA Viomercato (MI)	155 ppm of PCB	3.5 ppm of PCB Transformer ready for re – use	97.7 % on PCB	1600 kg slags	6500 kWh electricity		

Table 4: Utilities Required for PCB Capacitors Treatment
(Example of Canadian fixed plant)

Utility	Units	Quantity required per tonne of waste input	Quantity required per month (Semi-mobile plant)	Quantity required per month (Full-scale plant)
Electricity	MWh	1.0		10
Nitrogen	Nm ³	192		1,920
CO ₂	Kg	100		1,000
Natural Gas	Nm ³	768		7,680
Processing Rate	kg/min			0.4
	Tonnes/month			10.4
	Tonnes/yr			130