



Comparison of Hazards, Regulatory Concerns, and Costs for Alternative Dry Cleaning Technologies¹



	Technology ²	Total Annual Cost (for first 5 years) ⁴	Primary Human Health and Environmental Hazards	Air Regulations (Bay Area Air Quality Management District)	Health Regulations (Department of Public Health)	Fire Regulations (Fire Department)	Other Considerations
	PROFESSIONAL WET CLEANING	\$20,926	• None identified	N/A	<ul style="list-style-type: none"> • Detergent; spotters should be chosen to minimize environmental concerns • Possible annual fee for hazardous material storage (if ≥55 gal hazardous detergent stored on site) 	N/A	• CARB offers \$10,000 grants for conversion (AB 998)
	CO ₂ cleaning ³	\$58,881	• None identified	N/A	• Possible annual fee based on volume of CO ₂ gas stored on site	<ul style="list-style-type: none"> • SFFD operational permit and annual licensing fee required • Use of Class I alkane co-solvent prohibited per CA Fire Code 1204.1 	<ul style="list-style-type: none"> • CARB's offers \$10,000 grants for conversion (AB 998) • Machine must be maintained to avoid CO₂ leaks
	Hydrocarbon solvents • DF-2000™ • EcoSolv® • Shell Sol • PureDry®	\$27,755 - \$28,535	<ul style="list-style-type: none"> • Neurotoxicity, eye, skin and respiratory irritation • Potential concerns for persistence and aquatic toxicity • Complex mixtures which may contain other ingredients of concern 	<ul style="list-style-type: none"> • Regulated under BAAQMD Rule 8-17 • Closed-loop machine required • Registration required • Permit required if >200 gal/yr gross solvent used 	<ul style="list-style-type: none"> • Annual fee for hazardous waste generated • Annual fee for hazardous material storage (≥55 gal stored on site) & compressed gas storage (if ≥200 ft³ N₂) 	<ul style="list-style-type: none"> • SFFD operational permit and annual licensing fee required • Combustible liquid (Class IIIA) • Ventilation, automatic sprinkler system, fire extinguishers as specified in Fire Code Ch 12 	• Emits smog forming volatile organic compounds (VOCs)
	GreenEarth® (D5) solvent	\$32,718	<ul style="list-style-type: none"> • Suspected carcinogen, reproductive toxin • Liver, immune and nervous system effects • Persistent in environment; detected in fish 	<ul style="list-style-type: none"> • Regulated under BAAQMD Rule 8-17 • Closed-loop machine required • Registration required • Permit required if >200 gal/yr gross solvent used 	<ul style="list-style-type: none"> • Annual fee for hazardous waste generated • Annual fee for hazardous material storage (≥55 gal stored on site) 	<ul style="list-style-type: none"> • SFFD operational permit and annual licensing fee required • Combustible liquid (Class IIIA)⁵ • Ventilation, automatic sprinkler system, fire extinguishers as specified in Fire Code Ch 12 	---
	CO ₂ cleaning ³ with Micell Technologies	\$58,881	• Possible use of perfluorooctanoic acid (PFOA) in Micell technology raises concerns for endocrine disruption, reproductive and developmental effects and persistence/bioaccumulation	N/A	• Possible annual fee based on volume of CO ₂ gas stored on site	<ul style="list-style-type: none"> • SFFD operational permit and annual licensing fee required • Use of Class I alkane co-solvent prohibited per CA Fire Code 1204.1 	• Machine must be maintained to avoid CO ₂ leaks
	Rynex™ solvent	\$26,220	<ul style="list-style-type: none"> • Chemical identity withheld as trade secret • Primary ingredient likely to be dipropylene glycol t-butyl ether (DPGTBE) • DPGTBE structurally related to a listed Proposition 65 carcinogen and predicted to be persistent 	<ul style="list-style-type: none"> • Regulated under BAAQMD Rule 8-17 • Closed-loop machine required • Registration required • Permit required if >200 gal/yr gross solvent used 	<ul style="list-style-type: none"> • Annual fee for hazardous waste generated • Annual fee for hazardous material storage (≥55 gal stored on site) 	<ul style="list-style-type: none"> • SFFD operational permit and annual licensing fee required • Combustible liquid (Class IIIB) • Ventilation, automatic sprinkler system, fire extinguishers as specified in Fire Code Ch 12 	<ul style="list-style-type: none"> • Emits smog forming VOCs • Complete assessment not possible without information on identity and hazards of chemical ingredients
	Hydrocarbon solvent Standard solvent blend	\$28,308	<ul style="list-style-type: none"> • Contains aromatic hydrocarbons (e.g. benzene, a carcinogen) • Neurotoxic, eye, skin and respiratory irritation • Potential concerns for bioaccumulation and aquatic toxicity 	<ul style="list-style-type: none"> • Regulated under BAAQMD Rule 8-17 • Closed-loop machine required • Registration required • Permit required if >200 gal/yr gross solvent used 	<ul style="list-style-type: none"> • Annual fee for hazardous waste generated • Annual fee for hazardous material storage (≥55 gal stored on site) 	<ul style="list-style-type: none"> • SFFD operational permit and annual licensing fee required • Combustible liquid (Class II) • Ventilation, automatic sprinkler system, fire extinguishers as specified in Fire Code Ch 12 	• Emits smog forming VOCs
	Perchloroethylenes	\$27,376	<ul style="list-style-type: none"> • Carcinogen (California's Proposition 65 list) • Liver and kidney effects • Neurotoxic, eye, skin and respiratory irritation • Persistent in the environment 	<ul style="list-style-type: none"> • Regulated under BAAQMD Rule 11-16 • Secondary control technology required • Registration required • Permit required • Mandatory phase out in progress 	<ul style="list-style-type: none"> • Annual fee for hazardous waste generated • Annual fee for hazardous material storage (≥55 gal stored on site) 	N/A	---
	1-Propyl bromide	---	<ul style="list-style-type: none"> • Male and female reproductive toxicant and developmental toxicant (California's Proposition 65 list) • Neurotoxic, eye, skin and respiratory irritation 	<ul style="list-style-type: none"> • Regulated under BAAQMD Rule 11-16 • Secondary control technology required • Registration required • Permit required 	<ul style="list-style-type: none"> • Annual fee for hazardous waste generated • Annual fee for hazardous material storage (≥55 gal stored on site) 	<ul style="list-style-type: none"> • ILLEGAL per CA Fire Code 1204.1 • Flammable liquid (Class I), NFPA rating 3 	• Use without sufficient stabilizer likely to cause corrosion and damage to cleaning equipment ⁶

¹This is a hazards based assessment of alternative garment cleaning technologies.

²Green Jet refreshing technology can be used to supplement an existing professional wet or dry cleaning machine: www.drywetcleaning.com

³This technology uses reclaimed CO₂ so no new greenhouse gases are generated.

⁴Cost/year for first 5 yrs based on machine, solvent, detergent, spotting agent, electricity, natural gas, waste disposal, filter/gasket, maintenance costs (CARB, 2006)

⁵Class determined based on flash point listed in MSDS for each solvent

⁶Wolf, Katy. 2006. n-Propyl Bromide Destroys Equipment in Dry Cleaning Plant. <http://irta.us/>