

Solar Water Heating Systems Types: Advantages and Disadvantages

	System Type	Characteristics & Uses	Closed/Open Loop	Advantages	Disadvantages	Climate Zones
Passive Systems	Integral Collector Storage (ICS)	<ul style="list-style-type: none"> • Integrated collector and storage directly on roof • Freeze protection limited to infrequent cold climates 	Open Loop	<ul style="list-style-type: none"> • Simple, no pumps • No moving parts • Requires no electricity for operation • Low maintenance 	<ul style="list-style-type: none"> • Inefficient in cold climates • Bulky 	Warmer Climates
	Thermosyphon	<ul style="list-style-type: none"> • Uses heat exchanger and antifreeze • Appropriate for cold climates • Storage and collectors on roof 	Closed Loop	<ul style="list-style-type: none"> • Simple, no pumps • No moving parts • Requires no electricity for operation • Good freeze protection 	<ul style="list-style-type: none"> • Highest roof load of all systems • Tank must be located above collectors • Bulky 	All Climates
Active Systems	Direct Forced Recirculation	<ul style="list-style-type: none"> • Uses water not glycol • Uses pumps 	Open Loop	<ul style="list-style-type: none"> • Higher efficiency • Can be powered by PV • Flexible collector location • Reduced overheating risk 	<ul style="list-style-type: none"> • Not eligible for CPAU Rebate • Freeze protection limited to climates with infrequent freezing • Inappropriate for use with hard water • Needs automatic drain valve 	Warmer Climates
	Indirect Forced Circulation (Closed Loop Glycol)	<ul style="list-style-type: none"> • Uses heat exchanger and antifreeze (glycol) • Uses pumps • Appropriate for cold climates 	Closed Loop	<ul style="list-style-type: none"> • Good freeze protection • Basic principles well understood by conventional plumbing trades • No problems with hard water 	<ul style="list-style-type: none"> • Two-wall heat exchanger & antifreeze reduce efficiency • Fluid may break down at high temperatures 	All Climates
	Indirect Forced Circulation (Closed Loop Drainback)	<ul style="list-style-type: none"> • Uses water not glycol • Uses Pumps • Designed to drain water when pump stops 	Closed Loop	<ul style="list-style-type: none"> • Good freeze protection • No problems with hard water • Good overheat protection • Can use one-wall heat exchanger 	<ul style="list-style-type: none"> • Heat exchanger reduces efficiency • Collectors and piping must have adequate slope to drain • Requires larger pump to lift water up to collectors when the sun comes out 	All Climates