## The Hidden Cost of Free C Compilers

Free C compilers distributed by semiconductor manufacturers can cost companies thousands of dollars in component costs by forcing them to use larger, more expensive microcontrollers than what is really necessary. These compilers typically have most optimizations shut off, increasing code size and requiring the engineer to select a device with more program memory.

How much can free compilers blow up code size? According to one semiconductor manufacturer, their free compiler's code size can be double that of what can be achieved with an optimizing compiler.

Optimization Levels and Code Density
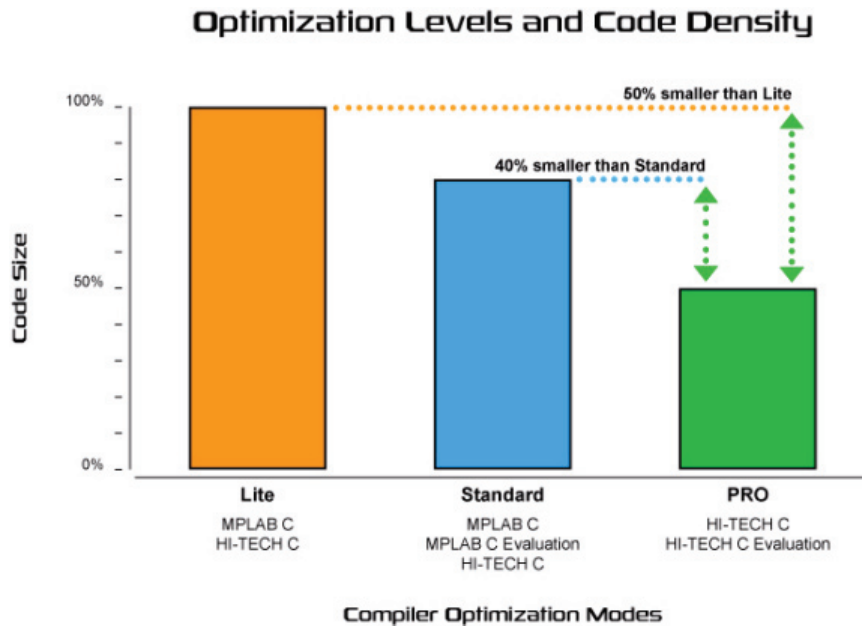
This means that that an MCU with up to twice the program memory size needs to be used in the design. What impact does this have on component costs for the project? To determine that, one needs only to compare pricing for devices that are identical except for program memory size. Using the manufacturer's own published volume pricing, costs were compared for three different projects.

	Device	Program Memory	Component Cost Difference	Project Cost Penalty (1Ku)
Project 1	PIC18F24J10	16K	$0.14	$140.00
	PIC18F25J10	32K		
Project 2	PIC18F1220	4K	$0.21	$210.00
	PIC18F1230	8K		
Project 3	PIC18F2585	48K	$0.28	$280.00
	PIC18F2680	64K		

The hidden cost of a free C compiler becomes much more apparent when component costs are examined, and directly affect the project's profitability. This cost penalty is further compounded by the number of MCUs used in the project and the number of projects that the compiler is used for.

The cost of a optimizing C compiler from CCS can often be recouped from just the component cost savings on a single project, with considerable additional savings far in excess of component costs realized from improved developer productivity.