

Read all about it: The looming carbon shortage

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If you read the "news" on a regular basis, you might be forgiven for thinking that carbon is some kind of toxic substance that threatens to extinguish all life on this planet.

We're told that our carbon emissions are choking the planet and creating such dramatic climate changes that we're all headed for extinction.

How do we reduce our carbon emissions?

How do we sequester carbon that's already in the environment so that its toxic effects won't push us past "tipping point" into oblivion?

Yes, it's pretty easy to see how we're rapidly moving towards the belief that carbon is worse than nuclear radiation or DDT.

But there really are two sides to this carbon coin and I fear we risk losing sight of just how important carbon is to us now and how much more important it will become in the future.

The obvious thing is that we're all carbon-based life-forms. Without carbon we just wouldn't exist.

Carbon plays a critical role in the very biological processes that provide us with fresh air to breathe and food to eat. All that's a given so I'm not going to mention it further.

But take a look at carbon as an element and you'll see just how interesting and absolutely essential it is -- especially for technology.

What's the hardest natural substance on the planet?

Carbon of course -- in the form of diamonds.

Despite centuries of formulating competitors such as silicon carbide and various ceramics, diamond is still the substance that is often used when something needs to be super-hard.

And guess what makes the most cost-effective method of removing organic molecules from contaminated water or air? Yep -- carbon does it again. Its affinity

for such substances makes carbon/charcoal filters a simple yet extremely effective way of purification.

Even something as "every-day" as the steel used to build bridges, cars and a huge percentage of the "things" we use every day is reliant on the beneficial effects of a small amount of carbon. Just a sniff of carbon can turn a otherwise soft, malleable iron into harder, stronger steel.

And while on the subject of ultra-strong materials we can't forget to mention carbon-fibre. This material is now the main-stay of composite construction where the ultimate in strength and light-weight is required.

But these are all old technologies that have been around for many years. It's the new carbon-based technologies that are even more exciting.

Cool new carbon-based substances are getting ready to provide us with some astounding breakthroughs.

Much of the nanotechnology research currently being undertaken involves carbon-based things such as carbon nanotubes, bucky-balls and graphene.

Materials such as graphene for example, as well as now being the strongest material known to man, offer some astonishing benefits in the area of computer technology.

Imagine being able to store every bit and byte currently accessible through the internet in a hand-held device. Impossible?

Well scientists working with graphene have developed a new kind of memory technology that promises to deliver hitherto unseen memory densities at spectacularly low power levels. Using a form of good old carbon, graphene-based memory can be created using layer of material just 10 atoms thick. What's more, by layering these memory arrays vertically the potential exists for massive data-densities to be produced.

Of course layering could be done with existing semiconductor memories, except for the fact that pretty soon the whole thing melts into a nasty puddle due to the amount of electrical energy required to keep the data "alive" or read/update it. That's where the graphene-based memory shows its other strength.

The amount of power required to run this new technology is so small that three-dimensional layering may finally become practical.

And what will we power such a hand-held know-it-all device with?

With a graphene-based supercapacitor of course!

I'm sure that as we continue to unravel the mysteries of the carbon atom we'll find ever-increasing uses for this amazing element in its various forms.

Which kind of leaves me wondering whether, one day in the distant future, we might find our selves facing a carbon-shortage.

Perhaps our descendants will look back at the 21st century with envy, marvelling that we had so much carbon to spare and worrying that they don't have enough to meet the demands of their contemporary and future technologies.