NSIGHT Out of the trans-fat frying pan, into the fire

THE original fast food nation is struggling to shed its addiction to unhealthy eating.

In a bid to prevent Americans dropping dead of heart attacks, efforts are gathering pace to eliminate artery-clogging fats from US consumers' diets. The task is proving far from simple, however. It is being hindered, for example, by fears that bans on certain fats will make convenience foods such as French fries, fried chicken and doughnuts less tasty, and that even without these fats fast foods could continue to pose serious health risks.

The fats on everyone's lips are trans fats. These synthetic lipids are extracted from partially hydrogenated vegetable oil, produced by chemically altering the oil to harden it and keep it from degrading at high temperatures. Trans fats are cheap, but they also raise levels of LDL cholesterol – the so-called "bad" cholesterol – in the body and reduce levels of "good" HDL cholesterol. These ill effects led to New York City announcing last month that trans fats would be

If fast food is made less unhealthy will it still taste just as good?

banned from use in its restaurants starting in July. This follows a decision earlier in 2006 by the US Food and Drug Administration to require trans fats to be listed on all packaged foods. Canada and the city of Chicago are now considering bans similar to New York's.

One problem, though, is that fast food companies have yet to find a suitable

replacement. In 2002, McDonald's introduced with great fanfare a zero-transfat canola (rapeseed) oil for its deep fryers but quickly withdrew it after fries cooked in the oil failed to pass taste tests. Similarly, Dunkin' Donuts has been working for years to come up with an alternative to trans fats for its pastries and doughnuts. The company has evaluated more than 22 alternative oils in laboratory tests, but has yet to find one it regards as suitable.

The American Heart Association, whose mission is to reduce deaths from cardiovascular disease, initially refused to endorse New York's ban, fearing it would



have "unintended and adverse consequences". These include the possibility that companies would simply switch back from using trans fats for cooking their foods to saturated fats, which also boost LDL cholesterol levels. Fast food companies used to fry their foods in saturated fats such as palm or coconut oil, or beef tallow such as that used by McDonald's before the 1990s.

More encouragingly, evidence from outside North America suggests that neither trans fats nor saturated fats are essential for producing cheap, tasty convenience food. In 2003, Denmark became the first and so far only country to effectively ban trans fats in restaurants and packaged foods, by stipulating that oils could contain no more than 2 per cent of these fats.

"This business with taste is a pseudo-argument," says Steen Stender, a cardiologist at Gentofte University Hospital in Copenhagen. "In Denmark nobody can tell a difference in taste, even with what you call the Danish pastry."

According to Stender, the country has seen a 20 per cent fall in deaths from heart disease since the 2003 ban, with companies such as McDonald's switching to mono-unsaturated fats like canola oil. "We have managed to do it without resorting back to saturated fats," he says. **Phil McKenna, Boston**

Could 'mirror matter' give us limitless energy?

ONLY the foolhardy tend to propose ideas to generate near-limitless energy. Yet that's what one Russian physicist has done, and rather than dismissing his proposal out of hand, some experts have welcomed it as "thought-provoking".

That doesn't mean the idea is likely to bear fruit any day soon. "I'm afraid we will need to obtain a quantity of a hypothetical material known as mirror matter," says Zurab Silagadze of Novosibirsk State University, who dreamed up the scheme.

Some theories of fundamental particles imply that every particle must have a mirror partner – that an electron is twinned with a mirror electron, for instance. If such mirror matter exists, it would hardly interact with ordinary matter. Some even say it may account for the universe's "dark" matter. If such matter could be captured, Silagadze says it could then be used to generate near-endless amounts of energy.

If mirror matter were placed in a reservoir of ordinary matter, it would weakly absorb heat from its surroundings, which it would re-radiate as mirror heat in the form of mirror photons before it had a chance to interact once more with the ordinary matter. This rapid and irretrievable loss of heat would cool the reservoir, and if another reservoir of ordinary matter, initially at the same temperature, were placed alongside it, heat could flow from one to the other, allowing energy to be extracted from the system as useful work.

"The process will go on almost indefinitely, perpetuating a temperature difference and enabling work to be done.

"The basic idea is simply to exploit the cold mirror world as a heat sink, just as many of our generators use cold water" With a mirror-matter heat engine like this, we could extract nearlimitless work," says Silagadze. His calculations show that the proposal would not violate the second law of thermodynamics.

"The idea is simply to exploit the cold mirror world as a heat sink, just as our generators use cold water," says Max Tegmark of the Massachusetts Institute of Technology. Silagadze's paper has been accepted for publication in the journal *Acta Physica Polonica B*. If it stands up to further scrutiny then two further, and not inconsequential, challenges must be faced. The existence of mirror matter must be proved and, once this has been achieved, some must be found. **Marcus Chown**