

# To plan or not to plan the use of underground space

For cities all over the world, sustainable development is a key issue. But are they missing out on possibilities and is the proposed development really sustainable? Han Admiraal, chairman of ITACUS, explores with *T&T*

ITACUS, the ITA Committee on Underground Space, has looked into the question of whether cities are missing out on possible uses of underground space for sustainable development and come up with three white papers dealing with the use of underground space. Their basic finding is that not using underground space as part of developing a city is

## About ITACUS

The International Tunnelling Association's Committee on Underground Space (ITACUS) was set up to address the issue of underground space use worldwide and to raise awareness with regards to both the actual use and the need to develop a vision which allows for planning the use of underground space.

ITACUS has been created specifically to bring together professionals from around the world to address the issues that will arise from these needs. The ITACUS website can be found on the ITA site: [www.ita-aites.org](http://www.ita-aites.org) under 'committees'.

unsustainable. The second finding is that even when cities are using underground space, not planning the use also leads to non-sustainable development.

Below the surface of cities lies a vast social asset in the form of underground space. Underground space can be thought to consist of four major resources: space, water, geo-materials and geo-energy. Often when looking at the use of underground space, only the space resource is highlighted through examples such as underground mass rapid transport systems; quite rightly, as many of the world's mega-cities use the underground space for underground transport systems and have been doing this since the end of the 19th century. One of the more modern uses of underground space is for geo-energy purposes. In the quest for alternative and renewable sources of energy, geo-energy has proven to be an interesting concept. As these examples illustrate, there is most certainly a case for using underground space and indeed consider using it when talking about the development of cities. Not doing so leaves a valuable societal asset unused, an asset that can contribute greatly to sustainable development. Leaving



**Above:** Han Admiraal, ITACUS chairman, is a former professor of underground space for the universities of applied science in Utrecht, Tilburg and Vlissingen. He works as an independent consultant in the field of underground space and is based in Rotterdam, Netherlands.

it to go to waste therefore implies that any development not including use of underground space cannot be sustainable.

The two examples given above also illustrate that as underground space can be modelled to consist of the four mentioned resources, competition for space can arise

not only within the context of one of these resources but also between these resources. Cities which have long been at the forefront of developing large scale underground systems like London and Paris, are increasingly becoming aware of the problem of space shortage. There is

congestion below the surface causing new systems to be developed at greater depths with all the additional risk and costs this brings. It also means longer travelling times for passengers and more difficult evacuation scenarios in case of emergencies.

But not only do we see congestion in terms of space use from these transport systems. As the use of geo-energy applications is rapidly increasing, so is the chance of a potential conflict between applications in the horizontal plane, e.g. transport systems, and these vertical geo-energy applications. The conflict can be both in terms of hitting an object not charted but, more importantly, the vertical geo-energy applications could prevent future development in a serious way, given the great depth that these systems often reach.

ITACUS is trying to make the case for the necessity to plan the use of underground space by underlining these two potential conflicts. Not planning the use of

underground space leads to the current practice of 'first-come, first-served' usage of the underground space. This can lead to serious problems as many Western cities are already aware. It can also seriously hinder future sustainable development of underground space and therefore cities. Not planning the use of underground space is not only a bad policy decision in the short term, it leaves future generations with serious new problems in the long term. And that makes it another prime example of non-sustainable development.

A final reason for considering planning the use of underground space is that it can often lead to surprising new applications hitherto not considered. Kuala Lumpur has been successful in implementing its Storm Water Management and Road Tunnel (SMART). It has proven to be a smart thing to do. The combination of what to all intent and purposes is a large storm water drainage tunnel with a road tunnel leads to

an optimal usage of underground space. It combines two policy fields which would normally not be thinking of combining their actions. When cities develop a vision on the use of their underground space and then plan this use, they will find that combinations like the SMART in Kuala Lumpur will be found. Multi-functional use of underground space, combining its resources could very well prove to be the next step in sustainable

development of large and mega cities worldwide.

In the film Contact, Jodie Foster plays a scientist searching for alien life. When asked by a small child whether or not she believes there is life out there, she answers: "If not, it seems an awful waste of space." This applies equally to all that space below our cities. Develop a vision, plan the use and then start using it. We can no longer afford not to use it. ▀

**Below:** Helsinki, host city of World Tunnel Congress 2011: 'underground spaces in the service of a sustainable society' is the first city to have fully modelled its underground space

