

Re: Nuclear PBMR district heating

Source: <http://sci.tech-archive.net/Archive/sci.energy/2006-02/msg00015.html>

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 - *Date:* Thu, 2 Feb 2006 17:24:11 +0100
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Does the 1 degree per km refer to branch lines from a municipal power station?

Yes, it's a typical average worth in Italian DH networks, including some geothermal ones (for example, Lardarello)

So guessing a bit, this would have about 100MW of heat coming

out in about 5 branch lines, so 20 MW each.

A nuclear reactor on the other hand, would need to send 1GW of heat along a major "artery", to a city Centre branch distribution point. This would use a pipe some 50 times bigger, so with perhaps 7 times the surface area, giving a heat loss of 1C/7km.

That's the point. Nuclear district heating is not feasible with big nuclear reactors, 1 GWe or more. Small (165 MWe, 400 MW thermal each) pebble bed reactors could be a good solution, instead. I was thinking on a configuration of 8 reactor in 1 site, with 8 independent branch lines each one feeding different parts of the city.

If helium at 140 °C can heat up water at 100–120 °C the project is feasible, although typical long distances from town centers where nuclear reactors are usually placed (anyway, considering high HTGR reactors "passive" safeness, I assumed no more than 10 km)

Also, on this artery, it would be viable to have expensive insulation, e.g. vacuum.

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