

加强科技创新 提高煤层气综合利用水平

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晋城市煤层气开采集中在沁水煤田南部，主要有中联煤集团，山西晋城无烟煤矿业集团，中石油华北油田公司，亚美大陆煤炭有限公司等企业进行开采。为加快煤层气开采应用技术创新，推动产业快速发展，2008年省市科技部门支持沁水蓝焰煤层气公司建立了“山西省煤层气开发利用工程技术研究中心”。据统计，2008年全市累计完成钻井约2621口，年抽采煤层气16.5亿立方米，年利用率接近60%。其中40%用于民用燃料，30%用于交通运输业，20%用于发电，10%用于工业企业。民用燃料方面，全市现有8万户居民使用上了煤层气，是全国煤层气用户最多的地方；发电方面，全市累计建成煤层气发电厂24座，总装机容量达20万千瓦，是世界上瓦斯发电最集中、装机规模最大的区域；工业应用方面，在科技研发资金引导下，全市大部分的玻璃制造企业和陶瓷制造企业用了煤层气为燃料，为企业节能减排，循环利用做出了积极贡献。如晋城九州玻璃制品有限公司是我市玻璃行业的一家龙头企业，通过技术创新，2006年-2008年，先后以气代煤成功改造了生产工艺。未改造前年耗原煤8100吨，折标煤5786吨，每年向大气排放CO₂246吨，SO₂116吨，烟尘87

吨，灰渣 1736 吨，且拉力烟囱气温排放达 400 摄氏度。改造后该企业成品率提高 8%，品质价位提高 5%，跨入了蓝色环保企业行列，年节标煤 3672 吨，实现了清洁生产，提前两年超额完成了 25% 的 GDP 综合能耗指标，年直接受益超过千万元。尽管如此，我市在煤层气开发应用中，科技创新的力度还不大，煤层气作为新能源要在改造提升传统产业中发挥更大作用，需要改进提高的地方还很多，还有很多领域需要挖掘和开拓。

一、我市在煤层气开发应用中存在的主要问题

一是科技创新认识不到位。长期以来由于对煤层气开发和利用的认识还一直停留在为煤矿安全生产服务的附属地位，对煤层气开发利用在改善能源结构、调整产业结构、提高资源利用水平、保护生态环境等方面的重要性缺乏足够而深刻的认识，未能真正将其作为新能源、新产业对待。

二是人才匮乏、开发应用技术有待提高。缺少煤层气技术方面的人才储备，煤层气在勘探、生产、集输、利用等各方面都需要先进技术，尤其是勘探和生产工艺上更需要技术的不断更新。我市所处沁水煤田，煤层气资源储存条件具有压力低、渗透率低、饱和度低的特点以及地质变动的特殊性，而针对这些特点的勘探、生产技术和工艺尽管取得了阶段性成功，但仍是制约我市煤层气产业发展的关键因素。在利用上，过去除了民用外没有其它合理的利用手段，近年来利用方面多元化了，但仍然比较落后。

三是技术标准不统一，检测手段不完善。由于沁水煤田地域较大，不同的钻井其成份肯定不相同，但由于无统一检测标准，再加上检测技术及检测手段不完善，造成工业企业在应用中很难根据实际有效成份进行操作。

四是适用领域太窄。我市是全国无烟煤基地，煤化工是发展的重点，但至今只是把煤层气作为燃料，从未作为化工产品的原料，即使是作为燃料可直接或间接应用的领域还很多。

二、加强科技合作，提高煤层气应用水平

一是加强对外科技合作。我市煤层气开采的相关基础设施发展较快，但仍不完善，要形成独立的煤层气产业，还需要很大的资金投入和国际先进技术的引进。目前，美国和欧盟等国和地区在煤层气开发方面已经有相当成熟的技术，我们可以加强对外合作，只要政策到位，达到双赢，合作前景乐观。

二是实行上下游产业一体化。煤层气生产和销售必须同步规划，尽可能做到与煤炭、常规气、电力、化工等相关产业一体化发展，这样能促使相关行业的技术、设备和人才优势得到充分发挥。同时，在煤层气产品的开发利用上下功夫，构建我市煤化工、煤电、煤层气开发等循环经济产业群。

三是开展技术攻关和人才培养。从理论上讲，我市的地质条件复杂，煤层的特点是“三低”，即低压、低饱和、低渗透。针对煤层气开采、利用中出现的技术问题、共性技术问题、要根据自己的特点进行技术攻关。政府应积极帮助企业申报实施国家、

省、市煤层气开发利用项目；大力支持有研究能力、创新意识强的人才到理论基础雄厚、技术相当成熟的国家学习。同时，在建的晋城学院应设置相关学科，培养专门人才。

四是创建煤层气利用技术开发平台。巩固提高蓝焰煤层气省级工程技术研究中心功能；帮助煤层气利用企业建立研究开发中心；帮助符合条件的煤层气应用企业申报认定高新技术企业。

五是制定煤层气使用标准，完善检测手段。与多方合作利用煤层气，开展化工系列产品研究开发。

**Strengthen the Sci-tech Innovation,
Increase the Multipurpose Utilization of CBM
(coalbed methane)**

Director of Science and Technology Bureau, Wang Renqing

The exploitation of CBM in Jincheng is centered in the southern part of Qinshui Coalfield. The main companies to exploit CBM are China United Coal Group, Shanxi Jincheng Anthracite Mining Group, China National Petroleum Corporation Huabei Oilfield Branch and Asian American Coal Ltd. Co. To speed up the innovation of the applied technology of CBM exploitation and the growth of the industry, in 2008, technology divisions of Shanxi province and Jincheng supported Qinshui Blue Flame CBM Company to establish Shanxi Technology & Research Center of CBM Development and Utilization. In 2008, we completed 2610 wells, extracted out 1.65 billion cubic meters of CBM. The rate of utilization was close to 60%. 40% of the gas was used for domestic fuel, 30% for transportation, 20% for generating electricity, and 10% for industrial undertaking. In domestic fuel, we have eighty thousand households using

CBM in the city, the highest rate compared to other places in the country. In electricity generation, there are altogether 24 gas power station built up, with the total installed capacity of 200 thousand kw, making Jincheng the most concentrated place in generating electricity of CBM with the biggest scale of installed capacity. In industrial application, most of the manufacture of glasswork and ceramics uses CBM as fuel, making a great contribution in reducing carbon emission and saving energy by cyclic utilization. For example, Jincheng Jiuzhou Glass Corporation is a leading enterprise in glasswork in Jincheng. From 2006–2008, they were successfully improved processing techniques by using CBM instead of coal as fuel. Before the innovation, the annual coal consumption is 8100 tons of raw coal and 5786 tons of amount-to-standard coal. The annual emission of CO₂ was 246 tons, 116 tons of SO₂, 87 tons of smoke dust, 1736 ton of clinker. The temperature of the smoke stack emission is 400°C. Since the innovation, the rate of final products has increased 8 %; the price has increased 5% because of the good quality. The company has become one of the Blue Environmental-friendly Enterprises and it saves 3672 tons of standard coal every year,

realizing cleaner production, over fulfilled the GDP indicator of the overall energy consumption by 25% two years ahead of schedule, the annual direct benefit from it is more than 10 million RMB. Be that as it may, the development and use of CBM in our city and the technology innovation still have big room to be improved. CBM, being one of the new energy, must play more significant role in transforming and upgrading the traditional industries. There is much to be improved, to be developed and to be opened up.

I. The main problems existing in the development and use of the CBM in Jincheng

First, the problem is we are impercipient to the significance of technological innovation .For a long time, our understanding of the development and use of CBM focused on the coal mine safety in production, we didn' t fully realize its significance in improving energy structure, adjusting industrial structure, enhancing the utilization of resources and protecting ecological environment, so we didn' t take it as a new energy and a new industry.

Secondly, we are lack of talents as well as the

technology in exploitation, production, transportation and utilization of CBM. All these require advanced technology, particularly in exploration and production; constantly updated technology is more necessary. CBM in Qinshui Coalfield is in a storage condition with low pressure, low permeability, low saturation and particularity of geological changes. The exploration and production techniques and technology adapted to the condition has achieved certain success but it is still the key factor constraining the development of CBM industry. In the past, there was no more rational utilization of the gas except civilian use. The multipurpose utilization has been increased in recent years but is still relatively backward.

Thirdly, there is no standardized technique and perfect test method. Qinshui Coal Field covers quite a large area. Different wells have different components in CBM. It is hard for the enterprises to use CBM effectively in their production.

Fourthly, CBM is not used as widely as it should be. Jincheng is the base of blind coal. The main industry is coal chemical industry. Up to now, we only use CBM as a fuel.

It has never been used as the material for chemical and industrial products. As a fuel, it can be used in many other fields directly or indirectly.

II. Reinforce Cooperation in Science and Technology to Improve the Utilization of CBM (coal bed methane)

Firstly, we should reinforce international cooperation in science and technology. Our infrastructure for exploring CBM is still faulty though it is developed very fast. Heavy investment and advanced international technology are in great need to form a complete CBM industry. Now, the US and some European countries have rather mature technologies in exploring CBM. We can reinforce cooperation with them to have a win-win between the both sides only if we have a reasonable policy. The cooperation prospect is encouraging.

Secondly, both the upstream and downstream industry must be programmed all in one, including industries of coal, ordinary gas, power, chemistry and so on. CBM production and distribution must be planned at the same pace and developed together with the above industries. Only in this way can we make the best of the related technologies,

facilities, and talents. At the same time, we should put a lot of work in developing and utilizing CBM products to make our own economic cycle of coal chemistry industry, coal-electricity industry, industry of CBM exploration and so on.

Thirdly, we should make technical breakthroughs and train able people. In theory, Jincheng has a very complex Geological Condition. The characteristics of its coal seam are low in pressure, saturation and infiltration. We must make try to find ways to solve the technical problems, in exploring utilizing CBM according to their characteristics either individual or general. The government should help the enterprise in applying for national or provincial projects of CBM exploration and utilization. They should support those who are more conscious in innovation to study in the countries where there are both strong foundation of theories and rather mature technologies. At the same time, related specialties should be established in the future Jincheng Institute to forester specialized people.

Fourthly, we should create a platform for the technology of utilizing CBM to solidify the function of the Province-Level Project Technology Research Center, help

establish a CBM research and development center in the time when the enterprises are to be set up, help those qualified enterprises which are using CBM apply for the advanced and new technology enterprises.

At last, we should standardize CBM utilization, perfect the method of testing, have multi-cooperation to research and develop series of chemical products.