

构建“四网融合、绿智融合”的轨道交通发展新格局

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2022 年底,我国已有 55 个城市开通了 308 条城市轨道交通(以下简称“城轨”)线路,总里程超过一万公里,达 10 291.95 km。根据测算,我国城轨交通在未来 10 年合计增加 10 000 km 以上,2030 年末累计运营里程将达到 1.8 万 km,总里程比 2020 年会翻一番。因此,我国城轨在未来十年仍处于快速增长阶段,将面临快速发展和可持续运营的双重压力。

我国新型城镇化发展到了都市圈、城市群、区域一体化的新阶段,轨道交通被赋予建设“轨道上的都市圈、轨道上的城市群、轨道上的区域化(一体化)”的新使命。城轨网络化、都市圈同城化和城市群一体化将是发展趋势。

所谓“城轨网络化”是指:建设城市群内一体化的轨道交通网络,并推进轨道交通的“四网(高速铁路网、城际轨道交通网、市域(郊)铁路(轨道交通)网、大城市市区的地铁网)融合”。实现“四网融合”应注意以下四个方面的关键技术:其一,“四网融合”需从路网规划开始策划;其二,运输组织模式是发挥互联互通效率的关键;其三,制定相应的标准体系;最后,要采用互联互通的技术装备。

所谓“都市圈同城化”是指:形成以都市圈内的核心城市为中心、向周边城市辐射的城际铁路网络体系,促进都市圈内的城市协同发展,提高都市圈内轨道交通的通勤化水平。

所谓“城市群一体化”是指:轨道交通实现在城市群之内、各都市圈之间的互联互通,提供多枢纽——多中心的网络化运输服务。

因城市群的规模大了、层次多了、架构复杂了、管理跨界了、组织协调和技术要求也更高了,所以必须构建轨道交通发展的新格局。为了适应这一新形势,中国城市轨道交通协会(以下简称“中城协”)正在进行“多元融合可持续发展”的相关研究。

2020 年 3 月,中城协发布《中国城市轨道交通智慧城轨发展纲要》,提出了智慧城轨的发展目标和十大技术标准体系。2022 年 8 月,中城协又发布了《中国城市轨道交通绿色城轨发展行动方案》。作为我国城轨行业的顶层设计,这两个文件是姐妹篇、结伴而行,它们如同鸟之双翼、车之两轮,为建设绿智融合的城轨指明了方向。

“绿色城轨”的核心要义是:城轨全产业链各个环节和全生命周期各个阶段都要实现最大限度地降低能耗,减少二氧化碳排放;最大幅度地提升能效和资源利用率,提高运输效率、效益;最大可能地采用清洁能源,推动用能结构转换;最大程度地促进与城市协调发展,优化绿色出行。

“绿色城轨”为“智慧城轨”引领方向;而“智慧城轨”为“绿色城轨”提供技术支撑。

在全面推进我国从“城轨大国”迈向“城轨强国”的历史进程中,“路漫漫其修远兮”,还有许多的理论基础要建立、发展瓶颈要突破、技术壁垒要攻克。我们相信,在各级政府领导下,企业管理者、专家学者将不忘初心、牢记使命、聚心汇力,砥砺前行,建设“城轨强国”的目标一定能实现。

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Commentary

Constructing New Rail Transit Development Landscape of 'Four-network Integration, Green-intelligence Coalescence'

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By the end of 2022, there are 308 urban rail transit (hereinafter referred to as 'urban rail') lines launched in 55 cities in China, with a total length of 10 291.95 km. According to estimates, the total length of China's urban rail will increase by more

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than 10 000 kilometers in the next 10 years. By the end of 2030, the accumulated operating mileage will reach 18 000 kilometers, which will double that of 2020. Consequently, China's urban rail will still be facing rapid growth in the next decade, bearing dual pressure from rapid development and sustainable operation.

China's new urbanization has developed to a new stage of urban agglomerations, city clusters, and regional integration. New mission of constructing 'urban agglomerations on the rail, city clusters on the rail, and regionalization (integration) on the rail' is assigned to rail transit. Urban rail networking, urban agglomeration and synchronization, and city cluster integration will be the development trend.

'Urban rail networking' refers to the construction of an integrated urban rail network within urban agglomerations and the promotion of the urban rail 'four-network (high-speed railway network, intercity rail transit network, city (suburban) railway (rail transit) network, and large city central metro network) integration'. The following four key technologies should be noted in order to achieve 'four-network integration': firstly, planning of 'four-network integration' needs to start at the road network planning stage; secondly, the transportation organization model is the key to exerting the efficiency of interoperation; thirdly, corresponding standard system should be formulated; and finally, technological equipment for interoperation should be used.

'Urban agglomeration and synchronization' refers to the formation of an intercity railway network system radiating from the urban agglomeration core city to surrounding cities, promoting a synergistic development of the cities, and improving the urban rail commuting level within the urban agglomeration.

'City cluster integration' refers to the interoperation of urban rail within and between city clusters, providing a networked transportation service with multiple hubs and centers.

Due to the larger scale, more levels, complex architecture, cross-border management of city clusters, requirements on organizational coordination and technology are higher, and a new urban rail development landscape must be constructed. To adapt to this new situation, the China Association of Metros (hereinafter referred to as 'CAMET') is conducting relevant research on 'diversified integration and sustainable development'.

In March 2020, CAMET released the 'Development Outline for China's Urban Rail Transit Smart Urban Rail', proposing development goals and ten technical standard systems for smart urban rail. In August 2022, CAMET released the 'Action Plan for Green Urban Rail Development of China's Urban Rail Transit'. As the top-level design of China's urban rail industry, these two documents are twin works that assist the development jointly like two wings of a bird or two wheels of a car, showing the direction for building green and intelligent integrated urban rail.

The core concept of 'green urban rail' is that all aspects of the entire industrial chain and all stages of the life cycle should achieve maximum energy savings, reduce carbon dioxide emissions, maximize energy efficiency and resource utilization, improve transportation efficiency and benefits, use clean energy as much as possible, promote synergistic development of cities, and optimize green travel.

'Green urban rail' leads the direction of 'smart urban rail', while 'smart urban rail' provides technical support for 'green urban rail'.

In the historical process of promoting China from 'urban rail volume' to 'urban rail power', there are still many theoretical foundations to establish, development bottlenecks to break through, and technological barriers to overcome. We believe that under the leadership of government bodies at all levels, enterprise managers and expert scholars, with a firm commitment to their original mission and a concerted effort, the goal of building 'urban rail power' can be achieved.

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(Translated by ZHANG Liman)