

通稿

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创新驱动、绿色未来

Innovation- driven, Green future

全球首创十秒级闪充储能式现代电车在中国南车宁波基地下线

The Ten-Second Flash charge Supercapacitor Trolleybus, which is firstly invented in the world, rolled off the production line in CSR Ningbo base.

如何用现代化的产品满足城市交通出行的多样性需求？如何用绿色的电力驱动技术减少燃油型交通工具产生的尾气污染？如何改变传统电动汽车充电慢、电池使用寿命短等不足？中国南车株洲电力机车有限公司全球首创的十秒级闪充超级电容储能式现代电车为我们解开上述疑问的答案。

How could the modern products satisfy the Various requirements of the transportation in a city? How could the green electric drive technology reduce the tail gas pollution from fuel type vehicles? How to change the situation that traditional electric vehicles face such as the long charging time and short working life of the battery? The Ten-Second Flash charge Supercapacitor Trolleybus that is firstly invented in the world by CSR Zhuzhou Electric Locomotive CO., LTD. could stand out to give us resolution.

4月16日，主题为“创新驱动、绿色未来”的中国南车超级电容储能式现代电车全球发布暨宁波首用签约仪式在浙江省宁波市的中国南车产业基地隆重举行，旨在为全球相关客户打造环境友好型、资源节约型、应需定制的公共交通运输平台。

On April 16, CSR Supercapacitor Trolleybus Global Launch & Signing Ceremony for First-use in Ningbo was held in CSR Industrial base, Ningbo City Zhejiang province. It aimed to develop an environment friendly, resource-saving public communication and transportation platform which is customized by needs of relative clients worldwide.

当天，在浙江省副省长熊建平、宁波市市长卢子跃、宁波市副市长寿永年、鄞州区委书记陈奕君，中国南车董事长郑昌泓以及中国南车株机公司董事长、总经理周清和的共同启动下，由浙江南车现代无轨电车有限公司在全球首推的 18 米超级电容储能式 BRT 快速公交车、12 米超级电容储能式公交车惊艳亮相。

Xiong Jianping, the vice-governor of Zhejiang province, Lu Ziyue, mayor of Ningbo, Shou Yongnian, the deputy mayor of Ningbo, Chen Luanjun, the secretary of Yinzhou district, Zheng Changhong the chairman of CSR Group and Zhou Qinghe, the president and general manager of CSR Zhuzhou Electric Locomotive Co., Ltd., together launched the 18-Meter SuperCapacitor BRT Fast Trolleybus and the 12-Meter SuperCapacitor Trolleybus which stood out amazing on that day.

据周清和介绍，上述纯电动公交车无须架设空中供电网，只需在公交站点设置充电桩，利用乘客上下车 30 秒内即可把电充满并维持运行 5 公里以上，可在线循环往复运营。而其在制动和下坡时，还可把 80% 以上的刹车能量或势能转换成电能回收存储起来再使用。同样的运行工况下，其比没有回收能力的电车可以节约 30%-50% 的电能消耗。

According to Zhou Qinghe's introduction, overhead electrification lines are not necessary for the trolleybuses mentioned above. The only necessity is the charge pile set up on the bus station, which can ensure the trolleybus to be fully charged in 30 seconds when the passengers get on or off. The trolleybus can keep on running for 5 kilometers after charging in station and move in circles on line conveying passengers. When they brake or run on the downhill path, more than 80% of braking energy or potential energy can be transferred to

electric energy which can be stored and reused. Under the same running condition, they can save 30-50% more electric energy than that without energy recycle system.

车辆采用了低地板设计、铝合金车身等轻量化技术，相比于其他采用锂电池的慢充式纯电动公交车平均减重约 1.2 吨；配备了中国南车自主研发生产的永磁同步电机，效率高达 96%，低噪音，低电耗，无污染；还设计了安全逃生窗以确保乘客安全。

The buses adopt many light weight techniques such as the low floor design, aluminum alloy bodywork. Comparing to other pure electric buses with lithium ion battery trickle charge, they are 1.2 ton lighter in average. The buses are equipped with the permanent magnet synchronous motor independently researched and developed by CSR. The efficiency of the bus reaches up to 96%, and it is of low noise, low power consumption and non-pollution; Additionally, the evacuation windows are designed to ensure the safety of passengers.

中国南车首席专家杨颖介绍，该车的核心元器件——有机体系超级电容主要由高性能炭材料构成，安全性高，可反复充放电 100 万次以上，适用环境覆盖我国全部地域（-40~65℃），使用寿命长达十二年，可实现与车辆等寿命运用，而这些恰恰弥补了锂电池安全性低、环保性差、充电速度慢、低温区衰减、使用寿命短（3~5 年）的不足。

Yang Ying, the chief expert of CSR, said that the core component of the bus is the organic supercapacitor made of carbon-based materials. It is very safe and can charge-discharge over and over again for more than million times. The applical area covers most parts of China with the temperature range of -40~65° C, and the service life reaches up to 12 years, which can ensure equal-life usage as the bus. This exactly overcomes the disadvantages of the lithium ion battery which are thought to be of low security, inferior environmental friendliness, long charging time, low temperature zone damping and short working life (3~5 years).

当天还举行了多项商务签约仪式。

其中，浙江南车电车公司与宁波市、鄞州区分别签署 800 台、400 台超级电容储能式现代电车采购合同。

Several business signing ceremonies were held that day including the purchase contract signed between CSR and Ningbo municipal government of 800 Supercapacitor Trolleybuses, and the purchase contract signed between CSR and Yinzhou district government of 400 Supercapacitor Trolleybuses.

中国南车与宁波市政府签署产业金融投资合作备忘录；宁波能源集团、宁波产城投资管理有限公司、宁波南车现代交通建设投资有限公司与浙江南车电车有限公司签订充电桩建设运营合作多方协议。

CSR and Ningbo municipal government signed Industrial Financial Investment MOU. Ningbo Energy Group, Ningbo Chancheng Investment Management CO., LTD., CSRNM and CSR signed multi-party protocol about battery charging piles construction and operation.

中国银行宁波市分行、中国银行匈牙利分行、宁波南车产业基地联合进出口有限公司签署产融合作协议；浙江南车电车公司与宁波产城均胜新能源科技有限公司签订战略合作协议；浙江南车电车公司与美国 Green Power 公司签订战略合作协议。

Ningbo Branch of Bank of China, Hungary Branch of Bank of China, CSR Industrial Foundation Unit Import and Export CO. , LTD. signed the cooperation agreement of industrial capital and financial capital; CSR and Ningbo Chancheng Junsheng New Energy Technology CO., LTD. signed the strategic cooperation agreement. CSR and Green Power of the US signed the strategic cooperation agreement.

浙江省副省长熊健平指出：浙江省委、省政府将大力支持中国南车新能源电车产业在浙江的落地壮大。

Xiong Jianping, the deputy governor of Zhejiang Province, said: Zhejiang provincial party committee and government will strongly support the landing and growing of CSR new energy electric locomotive industry in Zhejiang.

中国南车董事长郑昌泓表示，中国南车将给予宁波南车新能源电车这一优势新产业更多的扶持，以为区域经济和社会发展发挥更加积极的促进作用。

Zheng Changhong, the chairman of CSR said that CSR would give more supports to this advantageous new industry of Ningbo CSR new energy electric locomotives to play a more active role in promoting the regional economic and social development.

背景资料

Background data

——绿色的理念引领城市交通

-Green idea guiding the urban traffic

将超级电容运用于列车的大胆想法，最早来自于中国工程院院士、中国南车株机公司专家委员会主任刘友梅在一次国际交流中迸发的灵感。

The daring idea of applying supercapacitor on trains was initially from the inspiration of Liu Youmei, the Academician of Chinese Academy of Engineering, the Director of Committee of Experts of CSR Zhuzhou Electric Locomotive Co., Ltd. during an international communication.

当时，一位专家介绍超级电容储能技术在港口起重机上的应用案例。刘友梅很快联想到，“既然吊装集装箱时消耗的势能可以转存储化在超级电容里，列车制动时消耗的动能为什么不可以？”

At that time, an expert introduced the cases about the application of supercapacitor storage technology on harbor cranes. Liu Youmei associated quickly that "now that the potential energy consumed while hoisting the containers could be exchanged and stored in the supercapacitor, why can't the kinetic energy consumed while the trains are braking do the same?"

经过调查，刘友梅了解到，大功率动力型超级电容储能技术在国内外其他领域也有应用，比如赛车、坦克及汽车的启停装置，但并非用于能量回收，而是用于在特定条件下进行能量补给。超级电容的这一优势刚好可以满足城际轨道交通的需求——不仅可使列车在进站停靠时 30 秒钟内快速充满电，制动时充电响应时间也可缩短至十毫秒级。

Through investigation, Liu Youmei understood that, high-power dynamical type of supercapacitor storage technology had also been applied in other fields both in domestic and

abroad, such as the start stopping devices of motorcycle race, tank, and auto. However, it was used for energy supplementation under special conditions instead of energy recovery. This advantages of supercapacitor could exactly meet the demands for inter-city rail transit which could not only enable the trains to be charged quickly within 30 seconds while they are stopping at the railway stations, but also shortens the charging response time during the braking process to 10 millisecond level.

在刘友梅院士的主持下，2012年8月，中国南车株机公司研制出世界首列采用超级电容的储能式轻轨列车，引领世界城市交通绿色、智能理念之先。

Under the guidance of Academician- Liu Youmei, CSR Zhuzhou Electric Locomotive Co., Ltd. researched and manufactured the world's first set of modern tramcar with energy-storage adopting supercapacitor, which guided the green and smart idea of world urban traffic.

刘友梅认为，现代轨道交通借助于高速和重载技术的进步，已完成自身技术演化。研发储能式轨道交通的目的，就是力争实现能量循环利用、高效利用的绿色智能发展道路。

Liu Youmei considered that, modern rail transit has completed its own technical evolution relying on the progress of high-speed and heavy load technology. The purpose of research and development of energy-storage type of trail transit is to realize the green smart development way of energy cyclic utilization and high-efficient utilization.

周清和告诉记者，城市交通出行的需求是多样性的，如大运量的地铁，中等运量的轻轨，中小运量的有轨电车等。无轨电车无需对既有城区道路破土改造铺轨道，只需在站点建设充电装置即可，其建设成本只有有轨电车的约十分之一，特别适合大中型城市的既有线路升级。无轨电车是有轨电车电车能实现很好的互补，比如，既有的有轨线路

就可以采用有轨式的储能式电车，而不便于破土或者改造的地方以及小运量的线路等就可以运用无轨电车。

Zhou Qinghe told to the journalist that, the demands for urban traffic are multifarious, such as the metro with large capacity, the light rail with medium capacity, and the tramcar with medium and small capacity, etc. The existing city roads is not required to be transformed to the pathways. It only needs to establish charging units on stations for trolleybuses. Therefore, the construction cost is only 1/10 of the tramcar, which make them especially applicable for the updating of existing lines in large and medium cities. The trolleybus is the complementation of tramcar. For example, in the existing tracked lines, tracked energy-storage type of electric car can be applied, while in places where it is inconvenient to break the ground or transform and where the lines have small capacity, trolleybus can be applied..

自 2012 年以来，中国南车株机公司在储能式轻轨列车原型车试验验证成功的基础上，又研制出储能式 100%低地板有轨电车，目前已经为广州、淮安提供了相关产品。而在宁波基地，全球首创性地开发出储能式（无轨）现代电车产品系列。

Since 2012, CSR Zhuzhou Electric Locomotive Co., Ltd. has researched and manufactured energy-storage type of 100% low-floor tramcar based on the successful experimental verification of energy-saving light-rail train prototype vehicle. At present, it has provided relevant products for Guangzhou and Huai'an. In Ningbo Base, it has initiatively developed the first energy-saving (trackless) modern electric locomotive product series all over the world.

——初具规模的绿色交通产业链

-Green traffic industrial chain gradually takes shape

在研制储能式轻轨\有轨电车\无轨电车的同时，中国南车株机公司在充分调查论证的基础上，加快了相关产业的布局，2012 年投资 18 亿元成立宁波南车新能源科技有限公司，建设一个全球最先进的超级电容研发、生产基地。

In addition to developing the energy storage light rails/streetcars/trolleybuses, CSR Zhuzhou Electric Locomotive Co., Ltd. speeds up the layout of relevant industries on the basis of full investigation and demonstration. It has invested RMB 1.8 billion in 2012 to set up the Ningbo CSR New Energy Technology Co., Ltd. to build a world's most advanced super capacitor development and production base.

2013 年，宁波南车新能源科技有限公司批量制造出了全球领先的 9500F (电容量单位：法拉) 有机系超级电容器单体，而更高电压及更高容量的单体也即将推出，使中国在高性能超级电容领域打破了国外技术封锁，成为世界上少数具备动力型超级电容研发制造能力的国家之一。

In 2013, Ningbo CSR New Energy Technology Co., Ltd. produced the world's leading 9500F (capacity unit: Farah) organic supercapacitors in batches and the higher-voltage as well as higher-capacity monomers will also be launched soon, allowing China to break the technology blockade of foreign countries in the field of high-performance supercapacitor and become one of the few countries in the world having the development and manufacturing capability of power type supercapacitors.

中国南车株机公司又在宁波投资控股成立浙江南车电车有限公司，该公司建有企业技术中心、院士工作站、检测试验中心、国际一流的生产线，自主掌握了新型现代电车交通系统的整车、电控、电驱、电源四大核心技术，主要业务集中在储能式无轨电车、新能源公交车、重要零部件以及维保服务等领域，致力于为客户提供具有国际水准的新

能源电车及系统解决方案。

CSR Electric Locomotive Co., Ltd. has invested and established the Zhejiang CSR Electric Locomotive Co., Ltd. in Ningbo which has the technology centers, academician workstations, testing centers and world-class production lines. It truly owns four core technologies, i.e. the new modern locomotive system vehicle, electrical control, electric drive and power. Its main businesses concentrate on the energy storage trolleybuses, new energy buses, important components, maintenance services and other fields. Further, it is committed to providing customers with international level new energy locomotives and system solutions.

浙江南车电车有限公司已研发出 C (超级电容 BRT 快速公交车)、M (超级电容或电容电池混合型普通公交车)、T (传统无轨电车/双源无轨电车) 三大系列产品，其车身长度、配备电量均可选装定制。

Zhejiang CSR Electric Locomotive Co., Ltd. has developed three series of products, i.e. C (super capacitor BRT express buses), M (super capacitor or capacitor battery hybrid ordinary buses) and T (traditional trolleybuses/dual-source trolleybuses). The body length and electricity quantity of the products is optional and can be customized.

车辆及无轨电车系统方面，中国南车宁波基地掌握了双电层活性炭超级电容、永磁同步电机和高效制动能量回收、大电流快速充电、分布式储能地面充电、快速智能对流受流、铝合金车身、安全避险设计、城市智能公交网络对接等八大技术。

In terms of vehicles and trolleybus systems, CSR Ningbo base has mastered eight technologies such as the double electric layer activated carbon super capacitor, permanent magnet synchronous motor and efficient braking energy recovery, heavy current fast charging, distributed energy storage surface charging, fast intelligent convection current collection, aluminum alloy body, safe hedge design and intelligent urban bus networks docking.

——为用户量身打造新型无轨电车

-Provide tailored new trolleybuses for users

周清和透露，就城市交通而言，修建地铁需要百亿元量级（省级）的投入，而有轨电车属于十亿元量级（地市级财政）的投入，无轨电车则更低，属于千万元量级（区、县、镇）的投入，其新建线路对于很多地方政府来说能承受得起。

Zhou Qinghe, the president of CSR Zhuzhou Electric Locomotive Co., LTD., said that, in terms of the urban transportation, the construction of subways needs ten billion yuan level (provincial) investments, but the streetcars need one billion yuan level (municipal finance) investments and trolleybuses need ten million yuan level (district, county and town) investments which are even less, so that many local governments can afford the new lines.

而对于既有的中东欧国家市场，原来就建有有轨电车和无轨电车，目前已经使用三、四十年，更新换代的市场容量巨大。

As for the existing markets in Eastern European countries, the originally built streetcars and trolleybuses have been used for three or four decades, so there is a huge replacement market capacity.

随着传统能源的短缺和人们环保意识的提高，加速了新能源交通工具的需求，特别是在大城市，车站间距较短，车辆频繁刹车停车，这种超级电容储能式无轨电车更加适宜，有利于节约能源和减少碳排放。（颜常青、吴燕青）

The shortage of traditional energies and the enhancement of public environmental protection awareness have accelerated the demand for new energy vehicles. Especially in large cities where the station distance is short and the vehicles frequently brake and stop, the super-capacitor energy storage trolleybuses are more appropriate and can help save energy and reduce carbon emissions. (Yan Changqing and Wu Yanqing)