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A New Approach to Green Urban Development in Asia

亚洲城市绿色发展的新途径



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Abstract

Development in China has presented an opportunity for a new paradigm in the creation of large-scale, low-carbon /carbon-neutral high-rise, mixed-use urban centers. Two projects, one in Guangzhou and one in Beijing from the same developer, have presented a unique opportunity for creating mixed-use, transit-oriented, livable, totally integrated and highly energy efficient development on a very large scale similar in size to many existing urban downtown cores. These new urban centers are fully self-sustaining in their mixed-use programming, which not only include the typical uses such as office, housing, hotel and retail, but go beyond those uses to provide an entire urban cultural and recreational layer. Mixed development at this size provides an opportunity to design and integrate comprehensive urban systems to the highest green standards available and to achieve green levels heretofore not obtainable at a city scale.

Keywords: Sustainability, Urban, Future, Mixed-Use, Transit-Oriented, Large Scale

摘要

中国目前发展为建设大规模低碳型高层、混合使用的城市中心提供了一个前所未有的机遇。以广州和北京的两个大型城市规划设计项目为例，充分展示了以交通为导向、高节能、宜居性、综合开发，其发展规模和多数美国城市中心规模相当。这些新城市中心将由完全自我维持的混合用地功能地块构成，它们不仅包括典型的城市用地（例如办公、住宅、酒店和零售），还包括其它辅助用途，提供城市文化、娱乐、康乐等层面的功能。大规模的综合开发提供了在城市系统的层面的整体设计机会，并且让城市融合绿色节能标准，使城市达到前所未有的绿色水平。

关键词：可持续发展、城市、未来、综合使用、公共交通为导向、大规模

Introduction

China has developed a coherent national policy for sustainable urban design. The country's twelfth five-year plan has a major emphasis on green building and green cities. The implementation of this policy is through the Ministry of Housing and Urban-Rural Development (MOHURD), and the goal is to reduce energy consumption in China to at least maintain, and hopefully even decrease, its energy appetite. The expansion of energy consumption has come from two sources: 1) the increasing urbanization of China's population; and 2) the increasing wealth and standard of living. One of the key strategies for dealing with this issue and achieving sustainability is through compact downtown development.

Green, compact downtown development has three main pillars – sustainability, mobility, and livability – which are integral to a city's viability (see Figure 1). Development in China has presented an opportunity for a new paradigm of low-carbon to carbon-neutral high-rise, mixed-use urban centers. The evolution of development at a scale similar to existing urban downtown cores is perfect for integrating those three pillars. The paper will review two projects, both from the same

引言

中国已经为可持续发展的城市设计发展出了相应的国家政策。其中第十二个五年计划也以绿色建筑和绿色城市为重点。这项政策的实施主要通过中国住房和城乡建设部，目标是至少要维持目前中国的能源消耗量，最好能达到减小中国能源消耗的目的。能源需求扩大的原因主要有两个：1) 中国城市人口的不断增加；2) 财富的不断增长和生活水平的不断提高。解决这一问题，实现可持续发展的主要手段之一是通过紧凑型市中心发展。

绿色城市发展有三大支柱：可持续发展、移动性和宜居性，这些都是维持城市生命活力所不可缺少的因素（见图1）。中国现在的发展为我们建设低碳及零碳的高层建筑，混合使用的城市中心提供了一个很好的机会。现有规模的市中心的发展演变，为融合这三大支柱提供了绝好机会。本文将以前由同一家开发商提出的两个项目为例，该项目都为展示创建综合开发利用，以交通为导向、体现宜居性、大规模集成开发的市中心项目提供了绝好的机会（见图2）。该类项目的规模和很多美国城市中心的规模相当，主要的区别是后者的发展需要时间和复杂的演化，但新的项目可以一次性完成，为超前的设计和高端的混合开发提供了机会。



Figure 1. Viability Diagram (Source: Heller Manus Architects)
图1. 城市生命活力图解 (来源: 赫勒·曼纳斯建筑师事务所)

developer, that have presented a most unique opportunity for creating large-scale, mixed-use, transit-oriented, livable, and totally integrated development (see Figure 2). These developments are similar in size to many existing urban downtown cores. The key difference is that while urban cores are built over time, these developments happen at once and therefore provide the opportunity for state of the art design and integration not previously possible.

The difference between traditional cores and these projects is that this new paradigm of urban development focuses on integrating sustainability and transit elements as part of the initial thinking and concept. The opportunity presented is that these new urban centers are fully self-sustaining in their mixed-use programming. These urban cores, not only include the normal uses (such as office, housing, hotel and retail), but go beyond those typical uses to provide an entire urban cultural and recreational layer. Further, each incorporates a totally integrated transit strategy to dramatically promote the ability to create an opportunity for a car-less urban environment. This approach results in the most highly energy-efficient urban development strategy possible.

Sustainability, Mobility, And Livability

Assessing a city's viability relies on integrating the three principles of sustainability, livability, and mobility. Often times in discussions of sustainability, not all three principles are considered. Many planners and technical professionals work on the mechanical details of sustainable design and stop there believing that they have achieved green practice. This is not the case because addressing

和传统的城中心不同的是,新的城市发展模式是在一开始的概念和想法中就结合了可持续发展和流动性。新的城市中心模式能够自我维持的综合功能,不仅包括典型的城市用地(例如办公、住宅、酒店和零售),还包括其它辅助用途,从而提供城市文化、娱乐、康乐等层面的功能。而且,各功能的设计都与交通规划相结合,以最大程度地创建一个以人为本的城市环境,从而实现城市发展节能最大化策略。

可持续发展、流动性和宜居性

评估一个城市生命活力依赖于“可持续发展、宜居性和流动性”三个基础原则的结合。通常人们只关注到可持续发展这个环节,而忽视了其它的环节。许多城市规划者、技术专业人员只关注可持续发展设计的技术细节,认为已经达到绿色实践,但事实并非如此。仅局限于技术方面的解决方案忽略了绿色城市规划原则的其它方面,即流动性和宜居性。政策制定者必须结合可持续发展的策略和大范围的流动性规划—从人行道、综合公共交通策略;同时,考虑到宜居性的原则,如提供开放空间和康乐的设施、文化历史古迹的保护,以及水和空气的保护—这些生命维持的基本元素(见图3)。缺少这些因素的融合,节能的目标不容易实现。要成功达到节能的目标,需要通过制定以创建能同时吸引政策制定者和普通大众的规划的措施。这样做更能够确保该城市规划和指导原则被完全采纳。通过激励而产生的规划政策比通命令产生的规划政策更可信。

要达到可持续性、流动性和可宜居性的三个目标,并实现潜在能源节约,专家团队和政策制定者以及规划者三方要在初始阶段就开始紧密合作。

可持续发展

目前,一些绿色国际标准,如美国LEED认证、中国绿色建筑三星级标准等,多为建筑技术层面的控制规范。而建筑节能、保护和节约用水系统和政策、最大化提高电网分布,以及最有效的利用可再生资源,则需要城市规划层面中解决。在大规模的开发项目中,建筑设计和绿色建筑技术往往与城市规划相结合,因此,既能保证绿色标准在宏观系统的可行性,如将电网供电的能力与建筑需求结合;在微观层面,在建筑系统内部,如通过高峰期和低峰期电能管理系统,在建筑层面上平衡建筑内的能耗和能量储存,减少对发电厂的建设需求。

流动性

在流动性方面,提出采用公共交通策略,既提供方便、舒适和更快捷的公共交通工具,使得居民愿意减少私家车的使用率。流动性规划应结合城市的布局特点,吸引人们使用各种公共交通途径,包括步行、公交快线、轻轨,甚至在可能的情况下,涉及水



Figure2. Guangzhou Aerial Plan (Source: Heller Manus Architects)
图2. 广州航片图 (来源: 赫勒·曼纳斯建筑师事务所)

technical issues does not take into account mobility and strategic green urban planning principles (livability). Planners and policy makers must integrate sustainable practice with wide ranging mobility implementation – from walkable streets to complete public transportation strategies - and with principals of livability such as open space and recreational amenities, historic preservation and conservation of light and air – all of the things that make life worth living (see Figure 3). Without this integration, energy reduction goals are not easily met. The path to success in energy reduction is best accomplished by creating a strategy that makes a plan that is appealing and desirable both for the policy makers and the public at large. By doing so, the probability of full adoption of the urban plan and guidelines is more assured. Planning policy is most reliably achieved through incentives, not by decree.

The way to achieve the three goals of sustainability, mobility and livability, and realize potentially great energy reduction, is through the integration of a broad team of experts working closely with the policy makers and the planners from the very beginning of a process.

Sustainability

Sustainable elements, no matter what standards (LEED, Green Star, etc.) are used, are mostly technical in nature. Energy efficient buildings, water policy and systems which conserve and promote clean water, and power grid systems to maximize power grid distribution and best practice of renewable resources are all considered in the planning. Further, building design and green building practices are best defined at the urban planning level, both to assure compliance, and to integrate anticipated energy needs with power grid supply. It is possible to also plan building systems to use peak and off-peak consumption and energy storage practices to reduce the need for more power plants.

Mobility

In the area of Mobility, a public transportation strategy is applied to provide incentives to make people want to stop using their cars and change to convenient, comfortable and more efficient transportation alternatives. The mobility plan for the two developments reviewed here have incorporated urban layouts that make it far more appealing to use public modes – everything from walking, to Bus Rapid Transit, to Light Rail and even including water transportation when possible. The combination of locating new, high density development in concert with these systems is essential.

The complete integration of urban and transportation planners from the very beginning of the work is the key to a successful mobility strategy. Given the choice between sitting in traffic and having a fast and comfortable public transportation system that arrives at or close to one's intended destination, the result will be a substantial shift away from the private car.

Livability

The key framework to all this is the incorporation of good urban design, to enhance social and quality of life principles and integrate them into the largely technical matters of sustainability and mobility. One needs to embrace the need to reprioritize the connection of the city with nature. Some of the key elements of that reconnection are in the greening of the city.

First, the incorporation of green roofs, more trees and planted area, rather than vast concrete plazas, will help prevent the heat island effect in warmer climates and in summer time everywhere. The heat island effect, where the concrete mass of the city retains and then re-radiates heat from the sun, is well known and has a profound impact on temperatures and comfort, as well as an enormous impact on energy



Figure 3. Beijing Project Site Plan (Source: Heller Manus Architects)

图3. 北京国际文化艺术中心总平面图 (来源: 赫勒·曼纳斯建筑师事务所)

陆交通等。同时公交系统规划与新型高密度发展相结合, 增强土地利用价值。

因此, 在项目初期结合城市规划和交通规划是流动性战略的成功关键。同时, 如果给人们两种选择: 自己开车, 堵车时困在车里; 或者乘坐舒适快捷的公共交通, 直接到达目的地, 或到达与目的地邻近的地方。其结果将会是更多人愿意选择后者。

宜居性

宜居性的主要原则是通过良好的城市设计, 遵循提升社会、居民生活质量的设计原则, 并结合可持续发展和流动性元素。要重新理解城市规划和自然之间的相关性需求, 城市绿化和广场的设计。

首先, 利用绿色屋顶, 通过树木、植被取代大面积的混凝土铺地将有助于防止城市热岛效应, 缓解日益炎热的气候。由于城市地区水泥、沥青等所构成的下垫面导热率高, 加之空气污染物多, 能吸收较多的太阳能, 有大量的人为热进入空气; 另一方面又因建筑物密集, 不利于热量扩散, 形成高温中心, 并由此向外围递减。众所周知, 热岛效应对于温度和舒适度有着很重要的负面影响。另外, 下午和傍晚高峰期空调冷气的使用, 也会增加能源的消耗。城市绿化也将也为居民创造了休闲和消遣的空间, 并且通过设计使得其在城市规划中成为一个特别的元素。

其次, 城市建筑规划适当融合综合景观规划, 在视觉上会使整个城市的规划布局更清晰, 也能清晰地显示出贯穿城市的步行道和自行车道。通过人优先过于车的原则, 提供在没有车的情况下, 人们也能以更方便、更经济的方式抵达目的地, 特别在人口密集的市中心。当规划行车优先于行人时, 往往导致交通缺乏人性化 and 便达性, 行人必须绕过, 或穿过道路。这样的交通规划, 往往导致车辆的使用就会增加, 最终达到饱和。因此, 要解决车辆超负荷增长的问题, 在推动机动车道路发展时, 也要平行发展可以代替车辆的其它交通途径。

广州综合发展城市中心

第一个案例是位于广州市中心的综合性城市中心。这个混合开发城市中心位于广州市中心的岛屿, 占地4百万平方米, 属于广州总体规划的一部分。项目总体规划共3平方公里, 包括了一个历史村落和悠久的港口的保存翻新, 以及住宅、商业和文化用地规划。完成后, 该项目将提供8万多名员工就业机会, 容纳3万新增居民 (见图4)。

位于广州创新技术区之一, 这个综合使用的城市中心具有高效节能的办公楼、高层和底层研发中心、住宅和酒店塔楼、零售街、会展中心、股票交易中心、娱乐设施, 设有两个公共交通中



Figure 4. Guangzhou Aerial Plan (Source: Heller Manus Architects)
图4. 广州航片图 (来源: 赫勒·曼纳斯建筑师事务所)

consumption for cooling during peak afternoon and evening hours. The greening of the city also creates open space for people to enjoy and, through design, can be the organizing spatial elements of a city's urban plan.

Second, the proper planning of an integrated landscape plan into a City's urban plan provides a visual clarity to the city plan. It is also a pathway through the city for walking and biking. It is essential to acknowledge the priority of people over cars, and to make getting around without the need for vehicles more convenient and practical – especially in dense downtowns. Whenever the car has priority, and people must go over, or pass under, roadways, the use of vehicles will increase. The auto problem can never be solved, and so every alternative means to get around without resorting to getting into an automobile should be developed whenever possible.

Guangzhou Mixed-Use Urban Center

The first example is in the City of Guangzhou a mixed-use urban center of 4 million square meters. This urban center is part of an area that is contemplated in a larger master plan. The master plan of 3 square kilometers encompasses the preservation and renovation of a historic village and historic port, as well as residential, commercial, and cultural uses. The population of this project will be about 30,000 residents and up to 80,000 workers (see Figure 4).

Located in one of Guangzhou's Innovation Districts, this mixed-use urban center features energy-efficient office and R&D high- and mid-rises, residential and hotel towers, retail streets, convention and stock exchange centers, entertainment and recreation amenities, and two public transit hubs, including a ferry terminal. Blending the characteristics of the Pearl River waterfront with the regional Lingnan style in the design, the site area is approximately 813,800 square meters with a total proposed building area of 4 million square meters. The development will be the leading center of the technology industry and is different from conventional high-tech parks and economic development zones through promoting new clustering of manufacturing R&D while balancing residential, retail, cultural, and recreational uses.(see Figures 5 and 6).

The project is a composition of buildings whose main ground plane is pedestrian-oriented with only electric public vehicles to get around. All the vehicular facilities are located below. The towers in this complex are twin towers of 350 meters. The island will be served by a



Figure 5. Guangzhou Mixed Use Urban Center (Source: Heller Manus Architects)
图5. 广州综合体城市中心 (来源: 赫勒·曼纳斯建筑师事务所)

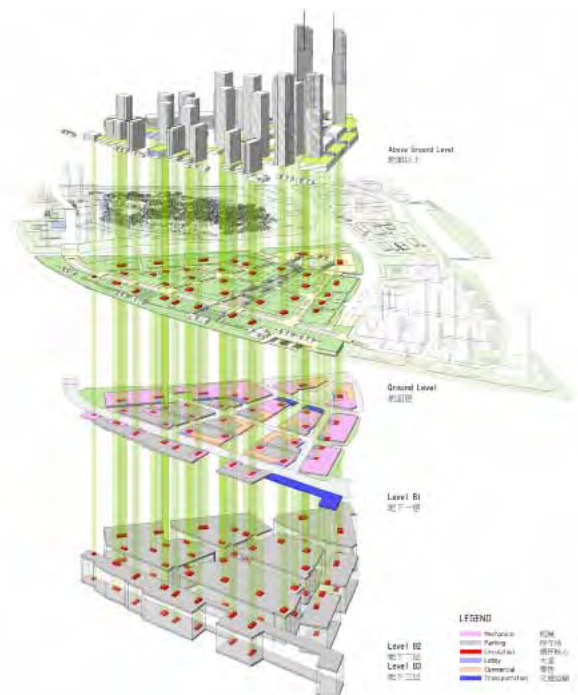


Figure 6. Guangzhou Mixed Use Urban Center Function Axon Analysis Diagram (Source: Heller Manus Architects)
图6. 广州混合使用城市中心功能分析图 (来源: 赫勒·曼纳斯建筑师事务所)



Figure 7. Guangzhou Proposed Water Taxi Plan and High-Tech Solar Boat (Source: Heller Manus Architects)
图7. 广州水上的士规划提议、高科技的太阳能船（来源：赫勒·曼纳斯建筑师事务所）

comprehensive transportation that includes ferry terminals (see Figure 7), underground transportation, bus, subway, pedestrian networks, and bike lanes. The landscaped central axis is a main focal point of the site, and, along with the waterfront open spaces and green roof gardens, will provide an important public amenity.

The project features a number of innovations. An integrated plan allows for minimizing vehicular use while maximizing alternative mobility strategies such as walking, biking, electric shuttles, metro, ferry and water transport. The project integrates the separation of the vehicular transportation level from the pedestrian level at a city scale such that walking through the entire area becomes uniquely dominant. The 24/7 aspect of uses, including retail, hotel, entertainment, and culture, at such a scale makes it more likely that people will take less trips to other places. The project transfers the density from the historic town. The center's ability to cogenerate energy allows heat from the commercial districts to provide energy for heating and cooling in the residential areas. The same principles for innovation also apply in the following Beijing example.

Beijing International Culture And Arts

The second example is a new international culture and arts urban core of 2.4 million square meters, strategically located in Beijing on the 4th Ring Road near the airport freeway (see Figure 8). Beijing International Culture and Arts is a visionary commercial, cultural and livable model for the future of global green cities. More than a mixed-use project, Beijing International Culture and Arts is a total living environment of great urban scale that is surrounded by nature. Addressing congestion and crowding by avoiding the established and congested central business district approach, the project concentrates a very high density, mixed use development in a great open area of green space (see Figure 9). The population of this project will be about 10,000 residents, 50,000 workers, and basically thousands of visitors, shoppers, customers, and hotel occupants.

This is a complex of mixed-use, high-rise towers sitting on a landscaped mountain which contains a vast retail, cultural, recreational, and convention complex, as well as hotel and residential mixed uses. The tallest tower in this project is 500 meters. The mountain, with its forest of trees, will contribute to reducing the heat island effect, naturally absorb carbon dioxide, provide insulation that reduces the energy consumption for both heating and cooling, and conserve the green scape of the city. Pedestrians can walk directly from the complex

转站，其中之一为渡轮码头。建筑形式结合珠江滨水及岭南风格的设计，总建筑面积为4百万平方米，占地共813,800平方米。与其它科技园和经济开发区只局限于制造和研发业不同，此科技中心还兼并住宅零售、文化和娱乐用途。预期，该区将成为科技产业的基地和活力社区。（见图5 和图6）

该项目由不同的建筑物群落组成，其地面交通以慢型交通为主，包括步行、电动车，而机动车辆都利用地下通道。2栋350米高的双子塔楼是整个建筑群落的标志型建筑。在岛上将会有一个综合的交通网络，包括渡轮（见图7）、地下交通、公共汽车、地铁、人行道和自行车道。景观的中轴线是该区域的重要部分，结合滨水开放空间和绿色屋顶花园，将成为一个重要的公共场所。

该新城市中心的规划的创新之处在于不仅将车辆的使用最小化，并将可替代交通方式的采用最大化，如步行、自行车、轻轨、城际、轮渡等。将车辆运输和行人步行相结合，但又以方便步行为主，行人可以步行穿过整个城市中心。商店、酒店、娱乐、文化等功能，每天24小时不间断营业，使人们更愿意在这里停留，而不是去其它地方。这个项目也改善了历史村落的人口密集状况。新的市中心有联合产能的功能，这样产生于商业区的热能能够为居民区所需的暖气和冷气提供能源。广州市中心的规划创意原则同样适用于下面要讲的北京的项目。

北京国际文化和艺术中心

第二个案例位于北京四环靠近机场的国际文化和艺术中心，总占



Figure 8. Beijing International Culture and Arts (Source: Heller Manus Architects)
图8. 北京国际文化艺术中心（来源：赫勒·曼纳斯建筑师事务所）



Figure 9. Beijing International Culture and Arts Rooftop Garden (Source: Heller Manus Architects)
图9. 北京国际文化艺术中心屋顶花园 (资料来源: 赫勒·曼纳斯建筑师事务所)



Figure 10. Beijing International Culture and Arts Atrium (Source: Heller Manus Architects)
图10. 北京国际文化中心艺术广场 (来源: 赫勒·曼纳斯建筑师事务所)

across a large landscaped public plaza to Beijing's famous Chaoyang Park. All levels of access are open to the sky through a covered skylit and landscaped atrium (see Figure 10).

The mix of uses provides 24-hour entertainment and functionality, creating a lively destination for those visiting Chaoyang Park and its surroundings, as well as for residents. The project incorporates family-friendly, diverse recreational and cultural uses to appeal to a wide range of ages and interests, including retail, restaurants, convention center, aquarium, dolphinarium, botanical garden, concert hall, health club, and international cultural museum (see Figure 11).

The project is public transit-anchored and will become a model for the reduction of traffic congestion in Beijing. The major roads are dropped so that vehicular access is one level below the plaza, and public vehicle

地240万平方米(见图8)。致力于创建宜居的、可持续发展城市的愿景,该项目在大面积的开放空间内,进行高密度、混合型集中开发。这样的开发可以避免并有效解决在传统中央商务区设计中遇到的交通拥挤和堵塞的问题。其区位条件得天独厚,东四环北路内和朝阳公园以北,地处国际机场高速南侧(见图9)。纵观历史,许多名城都是在道路和港口附近发展演化而成。尤其是北京这个历史悠久的国际名城,机场便成为世界商业和通信的枢纽。预计,该项目将涉及1万左右居民和5万工人,还有数千名游人、购物者、和住酒店者。

这是一个混合使用的高层塔楼群,坐落于优美人造山体,包括大规模零售、文化、娱乐、会展中心、酒店,和住宅的综合使用。最高的塔楼有500米高。山区上的树木将有助于减少热岛效应、吸收二氧化碳、提供保温、减少建筑供暖和制冷的能源消耗,致力于保护城市的绿色景观。行人可以步行穿过大型园景广场到达北京著名的朝阳公园。所有的天景都可以从天窗和园景中庭开放的天际线中看到(见图10)。

该项目满足了不同年龄层、消费水平的各异的娱乐和文化的兴趣爱好,包括零售、餐饮、会展中心、水族馆、海豚馆、植物园、音乐厅、健身俱乐部,以及国际文化博物馆(见图11)。中心24小时运营,为那些来访朝阳公园及其周边地区的居民提供了休闲好去处。

该项目以公共交通为主,将成为北京未来减少交通堵塞城市规划的一个范例。主干道修建于地下,所以来往车辆都将于商场下面通过。公共交通工具将在机动车层下一层通行,并与地铁直接相连。其以人为本的发展的模式将成为北京大规模、可持续发展的新标准。

结语

以上两个案例展示了创建综合混合型、宜居性和可持续发展的环境的新途径,重新定义了绿色城市的未来规划。能够设计和项目的整体实施这种大规模的城市开发项目,并运用绿色建筑技术是前所未有的。即便是快速发展的亚洲国家,对城市中心的规划建设,仍然存在分散实施的问题,局限了整体采取绿色标准的实施。城市规模的综合一体化开发项目,可探索最前沿的可持续发展理念,并将在绿色城市规划领域设立一个新标准。

以交通导向的发展方式能够达到自我维持,提供高效的节能功效。人们工作、生活、娱乐的地方更近,人们通过交通工具到达其它地方的需求也随之减少,会大幅度减少城市日交通总量。在世界人口不断增长的情况下,如何在规划和设计中巧妙地均衡流动性、宜居性和可持续性各因素,将是建设一个有活力的大型城市中心的新途径。

access is on a second level, below the automobile level. The project is served directly by metro. The development will set a new standard for sustainability in large-scale projects in Beijing.

Conclusion

These two examples demonstrate the new paradigm-changing approach of creating a holistically integrated, livable and sustainable environment that defines a new green urban future. The ability to design and implement an overall project at this scale, and using the correct green strategies, has not been realized before. Even with the rapid growth of Asian cities, there is still piecemeal implementation which limits the optimization of green strategies. By working on a single entity at this scale, the potential of cutting-edge sustainable thinking can be fully realized. As a result, projects like these can set a new standard.

The very large-scale, transit-based development approach is self-supporting and highly energy efficient. The need to travel to other parts of the city is as a consequence substantially reduced, resulting in an even larger potential drop in the number of day trips. Balancing all the elements of mobility, livability, and sustainability – and at a significant scale – is the path to viable, large urban centers in a world of increasing population.

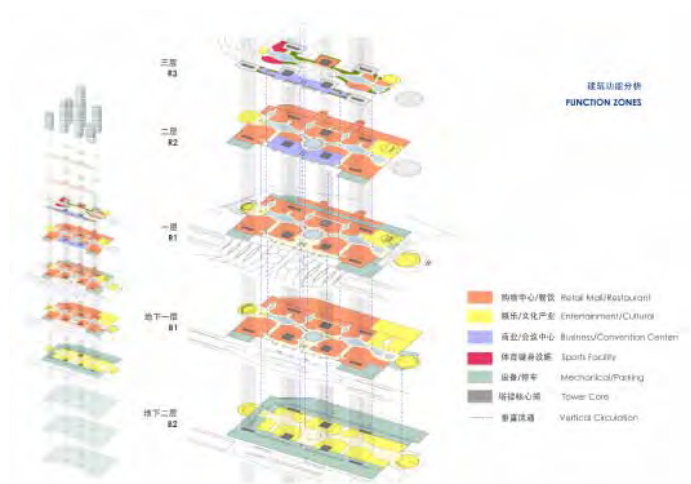


Figure 11. Beijing International Culture and Arts Function Zones (Source: Heller Manus Architects)

图11. 北京国际文化艺术中心 (来源: 赫勒·曼纳斯建筑师事务所)