# Sustainability Strategy Interactive Workshop

# 可持续发展战略互动研讨会

## Every click improves the future

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Digital Infrastructure contributes to the global economy and society without harming the planet

数字化基础设施为提高全球经济和社区质量做出贡献而不损害我们的地球

**Panel subjects:**

Uniting on a Common Industry Vision, what does this vision mean to you?

what can be done to help the green and sustainability of data centers?

Are there areas of collaboration for each other?

Is there a chance for mutual cooperation to produce a win-win and multi win situation that can not be achieved by working alone?

**座谈会话题：**

共同的行业愿景，这种可持续发展愿景对您意味着什么？

可以提供哪些绿色、可持续发展帮助？

是否存在相互协作的领域？

相互协作是否有机会产生单干无法达到的效果而带来双赢和多赢的场景？

**Strategic Initiatives 战略提议**

- **Unify** industry on sustainability **vision** and **actions**
  统一行业的可持续发展愿景和行动
- Make **renewable energy available** everywhere

使可再生能源随处可见

- Define **Sustainable Data Center Framework**
  定义可持续数据中心框架
- Drive sustainability through **Procurement**
  通过采购推动可持续发展
- Achieve **radical** efficiency through **Innovation**
  通过创新取得明显的效率提升

Introductions and personal viewpoint of the participants:

**以下是与会嘉宾介绍、个人意见与观点**

**李典林（Enso Li）**

Enso Li, currently working in Tencent, he is a senior data center architect, mainly engaged in data center planning and design, new technology research, etc., committed to the design and implementation of large-scale, efficient and energy-saving green data center. He has a lot of research and practical experience in modular data center methodology, T-block, MDC, HVDC, Electric direct supply technology, Integrated rack server, green battery and other aspects, leading the planning, design and construction of many large-scale data center projects.

李典林目前就职于腾讯，是一名资深的数据中心架构师，主要从事数据中心的规划设计、新技术研究等，致力于大规模高效节能绿色数据中心的设计实现。在模块数据中心方法论、T-block、MDC、高压直流、市电直供技术、整机柜服务器、绿色电池等方面有较多研究及实践经验，主导过多个大规模数据中心项目的规划设计及建设。

*His viewpoint:*

Sustainability is the common industry vision. Tencent is also the advocator and practitioner of the concept of green data center. Green, efficient, low TCO and sustainability strategy are not only the demands of Tencent and other data centers, but also the demands of the whole industry.

In the use of green and renewable energy, Tencent data center has been used on a certain scale in the past, such as the  Shanghai Qingpu data center use the gas CHP energy system, and the use of photovoltaic solar energy on the roofs of several data centers. However, due to the large volume of servers in the Tencent data center, there are many comprehensive considerations in the site selection, which are more business characteristics and customer needs, so the data centers will be build near in Beijing, Shanghai, Guangzhou, Shenzhen,etc . The use of renewable energy in these areas is still unable to be used on a large scale. So Tencent's new generation of large-scale data center parks are also actively responding to the guidance of relevant ministries and commissions to surrounding areas with more green energy, such as Huailai, Guizhou, Qingyuan, etc., and build large-scale photovoltaic on the roofs of these large parks to realize more green energy power supply.

Establish an industry best practice framework for the design, build and operation of a sustainable data center. Promoting sustainability through procurement, and in this regard, Tencent data center has formed the standard specifications, technical architecture and tools with the characteristics of "T-block / TMDC" through years of best practices. It covers planning and design, procurement, construction, operation and maintenance management. The PUE of Tencent's third-generation data center is about 1.3, and the average PUE of Tencent's fourth generation data center is less than 1.2. So through technological innovation, the $Co_2e$ are also greatly reduced.

If the power and other resources of the data center are used to the extreme, reduce the waste of resources and improve the using rate, the data center will also be more green and environmentally friendly. Therefore, the indicators such as IUE proposed by TGGC are good guidelines for the industry. In addition, the standardization, productization, prefabrication and modularization of the data center can also make the data center more green and efficient. Sustainability is a long-term strategy. Tencent data center's evolvable T-block architecture, HVDC, indirect evaporative cooling, photovoltaic solar energy, gas triple supply, waste heat recovery and other technologies and energy-saving measures are expected to help the industry and promote the industry's progress. Through the joint efforts of enterprises and industries(We can do more together), the data center can achieve better results in the sustainability.

*他的意见与观点：*

可持续发展是共同的行业愿景，腾讯也是绿色数据中心理念的倡导者和践行者，绿色、高效、低 TCO、可持续发展战略，不仅仅是腾讯等数据中心的诉求，也是整个行业的诉求。

在绿色可再生能源使用上，腾讯数据中心过去已有一定规模使用，如在上海青浦建设三联供数据中心，并在多个数据中心屋顶使用光伏太阳能等。但由于腾讯数据中心的服务器体量比较大，选址上有多方面的综合考虑，更多是业务特点和客户需求等，会优先北上广深以及周边城市，但这些地方可再生能源使用目前还是无法超大规模使用。因此，腾讯新一代大规模数据中心园区也是积极响应相关部委引导到更多绿色能源的周边地区，比如怀来、贵州、清远等地区，并在这些大园区的屋顶建设大规模光伏等来实现更多绿色能源供电。

对于建立行业最佳实践框架，以设计，构建和运行具有全生命周期意识的可持续数据中心，以及通过采购推动可持续发展，在这一方面腾讯数据中心通过多年的最佳实践已形成了具有“T-block\Tmdc”特色的标准规范、技术架构、以及工具，覆盖规划设计、采购、建设、运维管理等阶段。第三代数据中心 PUE 在 1.3 左右，第四代数据中心平均 PUE 低于 1.2，通过技术创新也大大减少了碳排放。

如果把数据中心的电力等资源用到极致，减少资源浪费并提升产出，那么数据中心也将更为绿色环保，所以 TGGC 提出的 IUE 等指标是行业很好的指引；此外，数据中心标准化、产品化、预制化、模块化，也可以使数据中心更为绿色高效；可持续发展是一种长期的战略，腾讯数据中心的可演进的 T-Block 架构，高压直流、间接蒸发冷、光伏太阳能、燃气三联供、余热回收等技术、节能措施使用，希望可以帮助到行业，并推动行业进步。通过企业和行业的共同努力可以使数据中心使可持续发展取得更好的效果。

**檀志恒（Swanson Tan）**

At present, Swanson Tan is working in Alibaba cloud intelligence business group, engaged in data center technology and design work, as IDC architecture and design director, senior technical expert. Mainly responsible for Alibaba data center technology architecture planning, evolution, optimization and design business. Before joining Alibaba, he worked in cloud & AI business unit of Huawei as the technical director of global cloud data center design and technology innovation; before joining Huawei, he had more than four years' work experience in AWS. He was a senior technical engineer in Asia Pacific region, responsible for the design and technical management of data center in China and Asia Pacific region. He has presided over and participated in the design of AWS large data centers in Ningxia Zhongwei, Tokyo, Singapore and Australia.

目前，檀志恒就职于阿里巴巴云智能事业群，从事数据中心技术及设计工作，任 IDC 架构及设计总监，资深技术专家。主要负责阿里巴巴数据中心技术架构规划、演进、优化及设计业务。加入阿里之前，供职于华为技术有限公司—Cloud&AI 事业部，担任全球云数据中心设计与技术创新技术总监；加入华为之前，曾在 AWS 有四年多的工作经历。期间任职亚太区高级技术工程师，负责中国及亚太地区数据中心的设计及技术管理工作。曾主持、参与完成 AWS 宁夏中卫、日本东京、新加坡及澳大利亚等地大型数据中

心的设计。

*His viewpoint:*

Sustainability is the common industry vision, and we need a unify industry on sustainability vision and actions. In terms of Alibaba data center, in view of the above challenges, Alibaba has done the following major tasks:

1. Based on the needs of business development and the actual situation, the reasonable layout of data center should first consider the sustainable supply of power, water and other resources, which is also the premise of maintaining long-term development of Alibaba cloud business and data center construction.

2. Alibaba has always adhered to technological innovation, and continuously invested in efficient power supply (Panama), Direct Liquid Cooling(DLC) technology and integrated design of cloud products, server hardware and data center infrastructure, so as to continuously improve the utilization efficiency of power and water resources in the data center.

3. Alibaba works closely with government planning, power and other relevant departments, ranging from green energy utilization to the planning of infrastructure such as power grid and water network. Alibaba promotes the healthy and sustainable development of the new infrastructure data center with its rich experience and technology.

*他的意见与观点：*

可持续发展是共同的行业愿景，我们需要有一个统一行业的可持续发展愿景和行动。就阿里数据中心而言，针对以上挑战，阿里所做的主要工作有：

1、基于业务发展需要及实际情况，合理布局数据中心，数据中心建设首先要考虑的就是电力、水等资源的可持续供给，这也是阿里云业务及数据中心建设保持长期发展的前提。

2、阿里内部始终坚持技术创新，在数据中心高效电源（巴拿马），浸没式液冷技术以及云产品、服务器硬件及数据中心基础设施一体化设计等方面持续投入，不断提升数据中心电力、水资源等利用效率。

3、与政府规划、电力等相关部门紧密合作，从绿色能源利用，到电网、水网等基础设施规划，以阿里的经验与技术推动新基建—数据中心的良性可持续发展。

**衣斌（Yi Bin）**

At present, Yi Bin works in Baidu system department, data center planning and innovation team, and he is a senior system engineer. He is responsible for system architecture design and new technology research and development of large-scale self built data center of Baidu, and leads the technical research and development and implementation of HVDC offline, distributed lithium battery, vertical monitoring architecture, power / HVAC automatic operation, etc.

衣斌目前就职于百度系统部，数据中心规划与创新团队，资深系统工程师，负责百度大型自建数据中心系统架构设计、新技术研发，主导 HVDC offline、分布式锂电池、垂直监控架构、电力/暖通全自动运行等技术研发及落地。

*His viewpoint:*

The sustainability strategy discussed today is a very good strategy. In short, to realize the sustainability of the data center, we hope to reach a unified vision and action for sustainability with the industry. However, the use of renewable energy and clean energy still depends on the result of site selection. We also hope that the government or industry can provide more guidance and create more convenient conditions.

Baidu data center planning and innovation team has been trying innovative solutions, and has achieved good results in energy-saving design, efficiency improvement and intelligent management. It has also purchased wind power and built photovoltaic power generation system in Yangquan and Yizhuang data centers, and studied how to improve the overall utilization rate of the data center. The IUE white paper which issued by TGGC is a good white paper. There is still a large market and space for sustainability in the future, which needs the joint efforts of the whole industry.

*他的意见与观点：*

今天讨论的可持续发展战略是非常棒的战略，简而言之，实现数据中心的可持续发展，希望可以和行业达成统一的可持续发展愿景和行动，不过在可再生能源、清洁能源的使用上，还是要看选址的结果，也希望政府或行业能有更多的引导，创造更多便利条件。

百度数据中心规划与创新团队一直在尝试创新的解决方案，从节能设计、效率提升、智能化管理方面取得了很好的成效，并在阳泉、亦庄等数据中心规模采购风电、建设光伏发电系统，同时研究如何更好提高数据中心整体利用率，去年绿色网格 TGGC 发布的《基础设施使用率 IUE 白皮书》是一个不错的白皮书。可持续发展未来还有很大的市场和空间，还需要整个行业一起努力。

**李建（Li Jian）**

Li Jian is the energy director of GDS, responsible for the implementation of the company's sustainable development strategy, power market trading, energy cooperation and other aspects.

李建是万国数据能源总监，负责公司可持续发展战略落地，电力市场化交易、能源合作等方面工作。

*His viewpoint:*

As a listed company with a high degree of social responsibility, GDS has a strong desire to implement sustainable and green data center operations. GDS will continue to use various technologies and operating methods to increase the proportion of renewable energy and reduce carbon emissions.

GDS Chengdu data center in Southwest China has achieved 100% renewable energy supply throughout the year. Since 2019, the cumulative use of renewable energy has exceeded 100 million kwh, and carbon dioxide emissions have been reduced by more than 50000 $tCO_2e$, which is the best practice of the same industry in China.

From 2019 to June 2020, GDS North China Zhangbei data center has accumulated more than 100 million kwh of renewable energy and reduced carbon dioxide emissions by more than 100000 $tCO_2e$.

GDS Shanghai data center makes full use of green energy in the park, and it designed and planned a largest solarwall in the data center industry according to the characteristics of no windows in the south facade. It can reduce and consume 90000 kwh of traditional thermal power and reduce carbon dioxide emissions by 60 $tCO_2e$ every year.

GDS Beijing data center is implementing the waste heat recovery project to recycle the heat discharged from the data center for the use of surrounding users and realize the recycling of energy. The project is expected to be completed in the third quarter of this year, with an estimated heating capacity of 17000gj and a reduction of about 280 $tCO_2e$ of carbon dioxide emissions.

GDS continuously optimizes the operation efficiency of the data center by using the energy efficiency management system and AI system independently developed by the company. As of December 31, 2019, several data centers of GDS have obtained recognition and awards related to sustainable development. Six of them have been rated as green data centers by the Open Data Center Committee (ODCC). Among them, one 5A level data center is the highest standard of green data center in China, and 12 data centers have obtained uptime certification.

China's government is promoting the popularization of green energy. GDS will actively respond to the national green energy policy and fully implement the concept of green data center.

*他的意见与观点：*

万国作为有高度社会责任的上市公司，有强烈的意愿实施可持续绿色数据中心的运营，将持续采用各种技术和运营手段提升可再生能源的使用占比以及降低碳排放。

万国数据西南成都数据中心已实现全年 100%可再生能源供给，2019 年至今累计可再生能源用量超过 1 亿千瓦时，减少二氧化碳排放 5 万 $tCO_2e$ 以上，是国内同行业的最佳实践。

万国数据华北张北数据中心 2019 至今-2020 年 6 月累计交易可再生能源超过 1 亿千瓦时，减少二氧化碳

排放 10 万 $tCO_2e$ 以上。

万国数据上海数据中心充分利用园区使用绿色能源，结合数据中心南立面无窗特点，设计规划了数据中心行业内最大的 solarwall，每年可减少消纳传统火电 9 万千瓦时，减少二氧化碳排放 60 $tCO_2e$。

万国数据北京数据中心正在实施余热回收项目，将数据中心排出的热量回收，供周围的用户使用，实现能源的循环利用。该项目预计今年三季度完成，预计供热量 17000GJ，减少二氧化碳排放 280 $tCO_2e$ 左右。

万国数据运用自主研发的能效管理系统、AI 系统持续优化数据中心的运营效率，截至 2019 年 12 月 31 日，万国数据多个数据中心已获得可持续发展相关的认可和奖励。6 个被开放数据中心委员会（ODCC）评为绿色数据中心，其中一个 5A 级数据中心作为中国绿色数据中心的最高标准，12 个数据中心获得了 uptime 认证。

我国政府正在推进绿色能源的普及，万国数据将积极响应国家绿色能源政策，全力实践绿色数据中心理念。

**许俊（Xu Jun）**

Xu Jun is currently the assistant president of Chindata Group in China. He has many years of experience in the data center industry. He joined Chindata in 2016. He is the core personnel involved in the green space development of multiple super large-scale data center clusters of Chindata Group. He has rich experience in the development of super large-scale customer demand, strategic location, and full life cycle services.

现任秦淮数据集团中国区助理总裁。具有多年数据中心行业经验，2016 年加入秦淮数据，是全面参与秦淮数据集团多个超大规模数据中心集群绿地开发的核心人员，在超大规模客户需求开发、战略选址、全生命周期服务等方面有丰富的经验。

Chindata Group is the leading carrier-neutral hyperscale data center solution provider in Asia-Pacific emerging markets, focusing on China, India and Southeast Asia markets. By providing top technology companies with centralized, standardized, and modular data centers solution, Chindata Group has built a full-stack and whole life-cycle partnership with customers from

planning, design, construction, to operation and maintenance.

秦淮数据集团（Chindata Group）是全球泛亚洲新兴市场作为业务发展核心区域的超大规模数字地产运营商，同时也是专注信息技术产业生态基础设施规划、投资、设计、建造和运营的综合服务提供商。

*His viewpoint:*

Qindata Group is an enterprise that pays more attention to green development. In July 2020, Qindata Group released the first ESG report of China's data center industry. It aims to promote the sustainable development goals(SDGs) of the United Nations.(*ESG,Environmental, Social and Governance)*

Therefore, Qindata Group fully agrees with the vision of sustainable development put forward by Imasons, and is willing to work together with the participants and policy makers in the whole industry, hoping to make the data center more cost-effective and more inclusive through a series of sustainable development initiatives, and try its best to provide more accessible and green basic services for human development.

Qindata is the first Internet technology enterprise in China that promises to transform to 100% renewable energy. Building a super large scale ecological cluster with 100% renewable energy supply is the long-term sustainable development goal of the enterprise. Since its establishment, Chindata Group has adopted a “three-in-one” model for site selection–at strategic locations where energy, connectivity, and clients’ business demand intersect. Energy is a top priority as the optimal sites must be surrounded with abundant renewable energy and surplus clean energy such as wind power. In this way, Chindata Group has injected vitality into the local sustainable economy. This is also a new concept of energy management proposed by Qindata Group.

In January and April 2019, the renewable energy coverage reached 100% in Guanting Lake Big Data Industrial Campus of the Pan-Beijing Area. Taihang Mountain Energy and Information Technology Industrial Campus of the Pan-Beijing Area commits to be the first data center in China to achieve 100% sourcing renewable energy.

Establish an industry best practice framework for the design, build and operation of a sustainable data center. In these areas,based on the design of a new generation of super large scale data center proposed by Alex Ju, founder of Qindata Group, the centralized, standardized and modular design,

construction and operation of future data center will not only continuously reduce costs for customers, but also be more environmentally friendly.

With the commitment to become one of the world's most eco-friendly data center provider, Chindata Group has managed to obtain as many as patents in the fields of electrical equipment, software systems, heating, and ventilation equipment, and construction through continuous innovation, which allowed for the maximization of energy efficiency and the enablement in achieving the optimal power usage efficiency standard, resulting in a declining carbon footprint.

Several data centers under Chindata Group have won endorsements from governing authorities for their green operation, including the “Data Center Green Classification (Operational) AAAAA” certificate issued by ODCC and TGGC, as well as being selected in the first batch of Green Data Center Models in Beijing.

Qindata group is actively exploring the development mode of "renewable energy and data center", hoping to contribute more to the industry.

Read more:https://www.chindatagroup.com/about/sustainability.html

*他的意见与观点：*

秦淮数据集团是一家比较重视绿色发展的企业。最近，秦淮数据集团发布了中国数据中心行业首份 ESG 报告（ESG 即环境、社会、治理），旨在推动联合国可持续发展目标（SDGs）。因此，秦淮数据集团非常认同 IMasons 所提出来的可持续发展愿景，愿意与整个行业内的参与者以及政策制定者共同努力，希望通过一系列可持续发展行动举措使数据中心更具成本优势、更普惠，尽最大努力为人类发展提供更可及、更具绿色活力的数据中心基础服务。

秦淮数据是中国首家承诺向 100%可再生能源转型的互联网科技企业，打造 100%可再生能源供电的超大规模生态集群是企业的长期可持续发展目标。早在秦淮数据集团建立之初，创始人 Alex Ju 就制定了“三流合一”（即能源流、数据流、业务流）的数据中心选址标准，“能源流”成为重要的选择原则，将数据中心部署在可再生能源富集区域，优先考虑使用可再生能源为数据中心提供能源供给，消纳本地已有“弃风弃光”资源，开发当地更多的绿色能源，促进当地社会经济健康发展。这也是秦淮数据集团提出的一个全新的能源管理概念。

2019 年 1 月和 4 月，环首都·官厅湖大数据产业基地可再生能源使用比例达 100%，环首都·太行山能源信息技术产业基地正在建设成为中国首个 100%可再生能源稳定供给的信息技术产业基地。

在建立行业最佳实践框架，以设计，构建和运行具有全生命周期意识的可持续数据中心方面，以秦淮数据集团创始人 Alex Ju 提出的新一代超大规模数据中心设计为基础，未来数据中心的集中化、标准化及模块化设计、建设和运营不仅将为客户持续降低成本，也将更加环境友好。

秦淮数据集团在电气设备、软件系统、暖通设备、建筑等领域不断创新并取得一系列专利，最高限度地提高能源效率，将 PUE 降低至极致水平，减少碳足迹，并提高可持续发展性。秦淮数据集团旗下多个大数据产业基地在绿色运营方面获得权威机构的认可，包括由开放数据中心委员会（ODCC）与绿色网格（TGGC）联合颁发的“数据中心绿色分级（运行类）”最高等级 AAAAA，以及入选北京市绿色数据中心首批示范名单。

秦淮数据集团在积极探索“可再生能源与数据中心”发展模式，希望可以给行业贡献更多。

**吴健（Wu Jian）**

Vice chairman of TGGC & senior director of solutions Department of Vertiv

绿色网格（TGGC）副主席，维谛技术有限公司解决方案部高级总监

*His viewpoint:*

In order to support the design, construction and operation of a sustainable data center with full life cycle awareness, there is no doubt that suppliers, supply chain professionals and decision makers need to maintain a friendly and cooperative relationship with the data center. Collaboration for each other can bring win-win and multi win scenarios. For example, in the project of Shenzhen PUE < 1.25, Vertiv provided the best practice. These best practices help the data center to develop towards the direction of security, green efficiency and low TCO. On the premise of ensuring the high availability of the data center, the efficiency and infrastructure utilization rate of the data center are maximized, and the PUE and construction investment cost are minimized by using the existing mature technology.

*他的意见与观点：*

在支撑设计，构建和运行具有全生命周期意识的可持续数据中心上，供应商、供应链专业人员和决策者与数据中心之间需要保持着友好协作的关系，这是毋庸置疑的。相互协作可以带来双赢和多赢的场景。如维谛技术参加了深圳 PUE<1.25 新政能评项目最佳实践，这些最佳实践助力了数据中心向安全、绿色高效和低 TCO 方向发展，并且在保证数据中心高可用性的前提下，最大限度提高数据中心的效率和基础设施使用率，利用现有成熟技术最大限度降低 PUE 和建设投资成本。

**李国强（Li Guoqiang）**

Vice chairman of TGGC & Chief engineer of energy marketing support department of data center of Huawei 绿色网格（TGGC）副主席，华为技术有限公司数据中心能源营销支持部总工

*His viewpoint:*

What needs to be sustainable is not only the data center infrastructure, but also the it side computing, storage, network, etc. For example, Huawei has a successful practice based on nearly 200 data centers around the world and provides a full stack data center solution. For example, Huawei has a successful practice based on nearly 200 data centers around the world and provides a full stack data center solution. It includes not only cooling, energy, water, electricity and other infrastructure, but also computing, storage and network equipment. From the perspective of the whole stack and life cycle of the data center, we hope to provide a green data center for the industry that which can matches the future it evolution, flexible expansion, continuous and advanced green data center.

*他的意见与观点：*

需要实现可持续发展的不仅仅是风水水电等数据中心基础设施，还包括 IT 侧的计算、存储、网络等。比如华为具有基于全球近 200 个数据中心的成功实践，提供了一套全栈数据中心解决方案，它既包括了风火水电等 L1 基础设施，也包括计算、存储和网络设备等。站在数据中心全栈全生命周期的视角，我们希望可以为行业提供一个匹配未来 IT 演进，灵活扩容，持续先进的绿色数据中心。

此外为响应国家节能减排的政策，在建设可持续数据中心时，建议融入创新的数据中心解决方案提高能效，降低 PUE。比如华为将 IT 技术、CT 技术融入到电力电子技术、热工热力技术，按照比特管理瓦特理念，推出一系列创新数据中心解决方案，包括 AI 能效优化、AI 运维、智能电力模块、智能锂电 UPS、智能间接蒸发冷却等，既满足了国家和地方政府对于节能的政策要求，并且在行业得到了广泛应用，助力

客户打造极简、绿色、智能和安全的下一代数据中心。

**李洁（Li Jie）**

Dr. Li Jie, Chairman of TGGC & deputy director of cloud big data Research Institute of CAICT

绿色网格（TGGC）主席，中国信息通信研究院云大所副所长

At the Workshop, Dr. Li Jie shared the development of green data center in China and TGGC promotes green and sustainability of data center.

TGGC works for end users, policy makers, and technology providers, and works to improve resource efficiency of data centers by identifying issues that are of concern to the industry and introducing tools, metrics, guidelines, measurement standards, and metric certification framework that are open to the industry, domestically and internationally. It works closely with international colleagues and relevant organizations to draw on the best minds in the industry and provides a bridge between the Chinese data center industry and data center industry globally to enable great ideas to flow freely without boundaries and to benefit all.

The research scope of TGGC includes but not limited to data center PUE test and evaluation technology method, MDC and data center air conditioning product energy efficiency, data center green energy saving technology, IUE and other research and project development.

In promoting the development of China's green data center, TGGC together with ODCC and CAICT, supported CCSA to conduct a number of research on green data center technical specifications, and supported a series of national and local government research on green data center related policies, and joined hands with Alibaba , Baidu, Tencent, China Telecom, China Mobile, etc., to promote the innovation, application and standard development of various energy-saving technologies in the data center, and lead the development of green data center standards.

Among them, the "Data Center Green Classification" evaluates and comprehensively scores the data center from three dimensions of energy efficiency, energy-saving technology and green management (full score of 100 points), and sets up additional points such as innovative exploration and green building

(full score of 10 points), and corresponding level of data center (A to AAAAA). As of 2019, dozens of data centers have participated in the green assessment.

The excellent green data centers with AAAAA:

会上，李洁博士分享了中国绿色数据中心发展情况&绿色网格（TGGC）在绿色、可持续发展的推进情况。绿色网格（TGGC）成员由最终用户、决策者和技术提供商组成，致力于促进绿色数据中心理念、标准和最佳实践，实现可持续发展并履行社会责任。核心工作内容是推动建立覆盖设计、测评和技术产品等方面的绿色数据中心标准体系，以及绿色标准宣贯和配套衔接落地。 同时，积极与全球的第三方组织、数据中心运营商以及数据中心工作者开展技术研讨与交流互动，以更好的推动国际标准的研制。研究范围包括不限于数据中心 PUE 测试评估技术方法，微模块数据中心、数据中心用空调产品能效，数据中心绿色等级评估，数据中心绿色节能技术，数据中心基础设施使用率 IUE™指标等研究及项目开展。

在推进中国绿色数据中心发展发面，绿色网格（TGGC）联合开放数据中心委员会（ODCC），中国信息通信研究院（CAICT）一起支撑中国通信标准化协会进行多项绿色数据中心技术规范的研究，支撑国家和地方政府的一系列绿色数据中心相关政策的研究；并携手阿里巴巴、百度、腾讯、中国电信、中国移动等，推进数据中心各项节能技术的创新、推广应用和标准研制，引领绿色数据中心标准的发展。

其中，“数据中心绿色等级评估”从能源效率、节能技术、绿色管理三个维度对数据中心进行评估和综合评分（满分 100 分），并设置了创新性探索、绿色建筑等加分项目（满分 10 分），数据中心对应的等级（1A—5A）。截至 2019 年，已有数十家数据中心参加绿色等级评估。

其中获得 5A 等级的优秀绿色数据中心：

[运行 AAAAA]百度云计算（阳泉）中心 2#模组

[运行 AAAAA]腾讯青浦上海电信/新奥泛能三联供数据中心 1#楼

[运行 AAAAA]阿里巴巴/张北云联数据中心

[运行 AAAAA]字节跳动官厅湖大数据产业基地一期

[运行 AAAAA]腾讯光明 中国移动 万国数据数据中心二期

[设计 AAAAA]百度云计算（阳泉）中心 1#模组

[设计 AAAAA]阿里巴巴/华通千岛湖数据中心

**Summary:Viewpoint and new Problems**

1. Sustainablily is a common industry vision. Most data centers will list sustainablily as an important strategy, but the degree of implementation will be different. From the perspective of TGGC, we advocate green and sustainable development. Through PUE test, Data Center Green Classification and IUE methodology, etc., we guide data centers to develop better and establish a good ecological environment.

2. There are many reasons that restrict the large-scale use of renewable energy. On the one hand, most IDC sites are located in top tier cities such as Beijing, Shanghai, Shenzhen and Guangzhou due to their business characteristics and customer demand, so it is difficult to use renewable energy on a large scale; on the other hand, the industry hopes that renewable energy can be affordable and can be purchased across regions, but it will take a long time for the transition.

3. China's data centers attach great importance to pue and consider energy conservation in the design, construction and operation and maintenance stages, including custom data center architecture, technical innovation, centralized equipment procurement, use of AI intelligent tools, optimization of energy efficiency management system, etc. Colo IDC will pay more attention to the utilization rate of basic implementation, while EDC such as banks will pay more attention to reliability.

4. From 2019 to 2020, the planning and layout of China's data center is changing under the influence of the national new infrastructure construction (new infrastructure) policy. 5g and cloud computing, IOT, AI, edge computing and other emerging technologies promote the development of each other, making the big data center become the future core information infrastructure carrier. The problems of computing power, data storage capacity and pue energy efficiency put forward new requirements for data center layout. Super large and medium-sized data centers: remote deployment to reduce costs, to handle "cold / warm data" and low timeliness business; Edge computing data center: distributed deployment is adopted to meet the demand scenarios of ultra-low delay, high real-time, high security and localization. These two kinds of layout will become a new form of data center industry in the future. Under the premise of green and sustainablily, it will be a new challenge to improve the utilization rate of data center racks.

5. In the current industry trend, some industry experts put forward the question worthy of thinking: will the current technology architecture be adopted in the future? How should a sustainable framework be defined? How to achieve the ultimate energy saving measures? However, How much power the data center uses should not be based on the construction scale, but on the power consumption of the server.

**总结：观点与新的挑战**

1、可持续发展是共同的行业愿景，大部分数据中心会把可持续发展列为重要的战略，只是实施的程度会有所不同。在 TGGC 角度，我们倡导绿色、可持续发展，通过 PUE 测试、绿色等级评估、IUE 方法论引导行业数据中心更好发展，并建立良好的生态环境。

2、可再生能源使用方面，限制了可再生能源大规模使用的原因有很多，一方面大部分 IDC 因其业务特点、客户需求原因选址在北京、上海、深圳、广州这样的一线热门城市，很难大规模使用可再生能源；另一方面，业内希望可再生能源可以平价，可以跨区域购买但这还需要一段较长的时间进行过渡。

3、数据中心是用电大户，中国的数据中心特别重视 PUE，在设计、建设、运维阶段都考虑到了节能，包括自定义数据中心架构、技术创新、设备集中采购、使用 AI 智能工具、优化能效管理系统等。Colo IDC 会更侧重基础实施使用率，EDC 如银行类会更侧重可靠性。

4、2019-2020 年，受国家新型基础设施建设(“新基建”)政策影响，中国数据中心的规划布局正在发生变化。5G 与云计算、IoT、AI、边缘计算等新兴技术的相互促进发展，使大数据中心成为未来核心的信息基础设施载体。算力、数据存储量以及 PUE 能效等问题都对数据中心布局提出了新的要求，超大型和大中型数据中心服务采用远端部署，降低成本，处理“冷温数据”和非时效性较高的业务；边缘计算数据中心采用分布式部署，满足超低时延、高实时性、高安全性、本地化等需求场景，这种两极分布将成为未来数据中心产业新形态。**在绿色、可持续发展的前提下，提高数据中心机柜使用率，将是一个新挑战。**

5、在当前产业趋势下，有业内专家提出值得思考的问题：未来是否还会采用当前技术架构？应如何定义可持续框架？节能措施如何更近一步？而数据中心到底用多少电，这不应该根据建设规模，应该根据服务器的用电量来计算。