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IBM现代化架构实现绿色计算与降本增效

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IT Economics Consultant, IBM Competitive Project Office

IBM z15/LinuxONE III 绿色机房 降本增效

Carbon Footprint Information on W3
https://w3.ibm.com/w3publisher/cpo/client-assessments/carbon-footprint-reduction

IBM IT Economics Carbon Footprint Assessment

Is your organization on a path to reduce greenhouse gas emissions?

Companies around the world are seeking to limit their greenhouse gas emissions. In some countries compliance with environmental directives is required to avoid financial penalties. For others, contribution to global sustainability is viewed as a competitive advantage for their business. Their clients prefer to do business with organizations that take action to minimize their greenhouse gas emissions.

Carbon footprint cost of computing

Reducing your organization's IT carbon footprint saves money. Most data center facilities consume up to 10 to 50 times the energy per floor space of a typical commercial office building[1], so for many businesses an energy efficient IT solution is an essential step towards achieving carbon footprint reduction.

IBM offers a no-charge technical and financial assessment of your IT environment to improve energy efficiency, reduce data center overhead and simplify operations.

Carbon Footprint Assessment

A no-charge carbon footprint assessment helps you

- Determine current footprint of your IT infrastructure (servers, floor space, data center consumption) and identify areas for power usage effectiveness (PUE) improvements, for example, software that enables high utilization of system resources and that enables use of virtualization to utilize targeted resources only when necessary
- Examine potential for workload consolidation to utilize fewer, more energy efficient physical servers
  - Reduces amount of underutilized resources
  - Simplifies administration overhead
  - Decreases other IT costs such as software, maintenance, server lifecycle management
- Compares energy usage and data center costs for centralized versus distributed server topologies

Get started

Send a request to the IBM IT Economics team at IT.Economics@us.ibm.com or ask your IBM Client Representative or IBM Business Partner.

Visit: ibm.com/iteconomics

[1] U.S. Department of Energy, https://www.energy.gov/eere/buildings/data-centers-and-servers

Reduce your organization's IT carbon footprint

Examine actual energy costs versus planned consumption

Reduce amount of underutilized resources

Define roadmap to achieve a more efficient data center and power usage effectiveness

Achieve infrastructure savings and lower IT spend

Assessment Outcomes

An IT Economics consultant will come on-site for a workshop to learn about your IT infrastructure, capture objectives for the assessment, gather information about your IT environment, and share best practices for energy efficiencies.

Your consultant will develop a business case with the following:

- Detailed analysis based on your customized scenario
- Quantified business values pertaining to environmental objectives for your company
- Recommendations to reduce your organization's IT carbon footprint
- TCO and ROI for a more energy efficient solution

Difference Achieved

Learn about the impact and savings other companies have achieved by reducing their IT carbon footprint.

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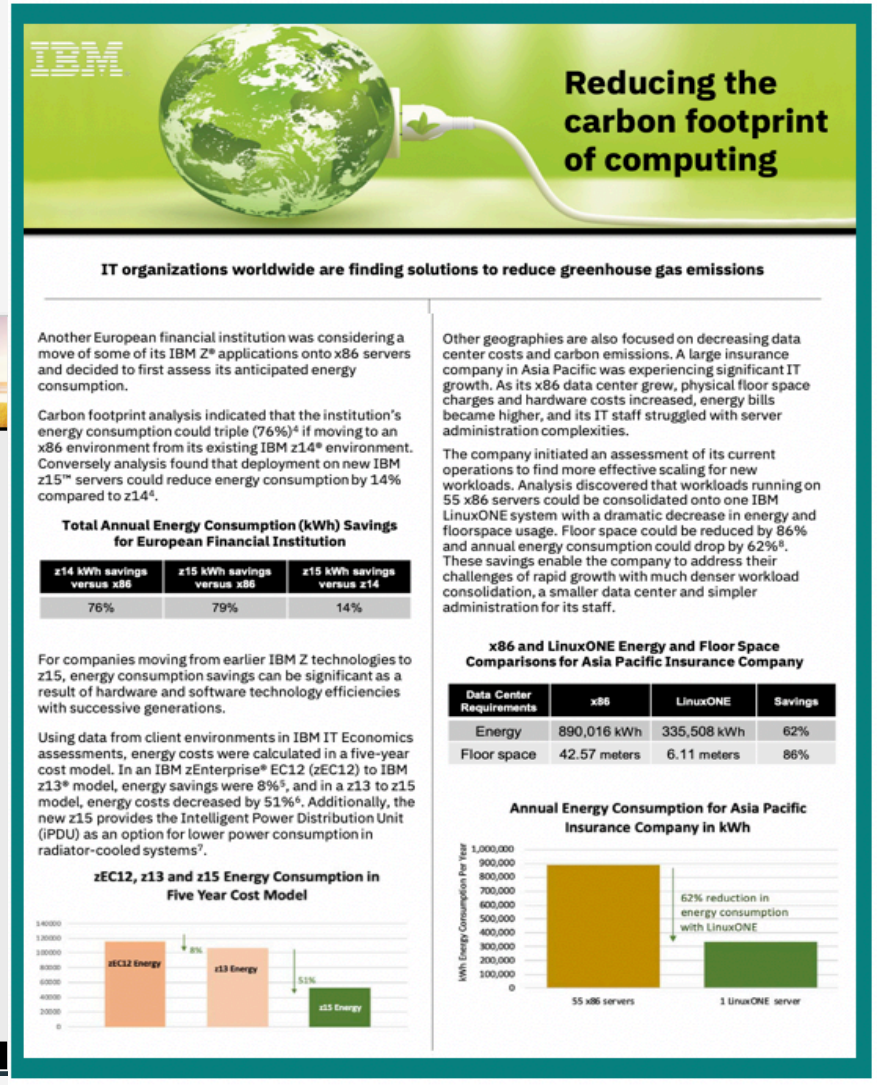
IBM IT Economics Consulting & Research

Link to IT Economics Carbon Footprint Assessment here
Contact the team at IT.Economics@us.ibm.com



IBM

Reducing the carbon footprint of computing

IT organizations worldwide are finding solutions to reduce greenhouse gas emissions

Another European financial institution was considering a move of some of its IBM Z® applications onto x86 servers and decided to first assess its anticipated energy consumption.

Carbon footprint analysis indicated that the institution's energy consumption could triple (76%)[4] if moving to an x86 environment from its existing IBM z14® environment. Conversely analysis found that deployment on new IBM z15™ servers could reduce energy consumption by 14% compared to z14[4].

Total Annual Energy Consumption (kWh) Savings for European Financial Institution

z14 kWh savings versus x86	z15 kWh savings versus x86	z15 kWh savings versus z14
76%	79%	14%

For companies moving from earlier IBM Z technologies to z15, energy consumption savings can be significant as a result of hardware and software technology efficiencies with successive generations.

Using data from client environments in IBM IT Economics assessments, energy costs were calculated in a five-year cost model. In an IBM zEnterprise® EC12 (zEC12) to IBM z13® model, energy savings were 8%[5], and in a z13 to z15 model, energy costs decreased by 51%[6]. Additionally, the new z15 provides the Intelligent Power Distribution Unit (iPDU) as an option for lower power consumption in radiator-cooled systems[7].

zEC12, z13 and z15 Energy Consumption in Five Year Cost Model

Other geographies are also focused on decreasing data center costs and carbon emissions. A large insurance company in Asia Pacific was experiencing significant IT growth. As its x86 data center grew, physical floor space charges and hardware costs increased, energy bills became higher, and its IT staff struggled with server administration complexities.

The company initiated an assessment of its current operations to find more effective scaling for new workloads. Analysis discovered that workloads running on 55 x86 servers could be consolidated onto one IBM LinuxONE system with a dramatic decrease in energy and floorspace usage. Floor space could be reduced by 86% and annual energy consumption could drop by 62%[8]. These savings enable the company to address their challenges of rapid growth with much denser workload consolidation, a smaller data center and simpler administration for its staff.

x86 and LinuxONE Energy and Floor Space Comparisons for Asia Pacific Insurance Company

Data Center Requirements	x86	LinuxONE	Savings
Energy	890,016 kWh	335,508 kWh	62%
Floor space	42.57 meters	6.11 meters	86%

Annual Energy Consumption for Asia Pacific Insurance Company in kWh

Reducing the carbon footprint of computing External paper

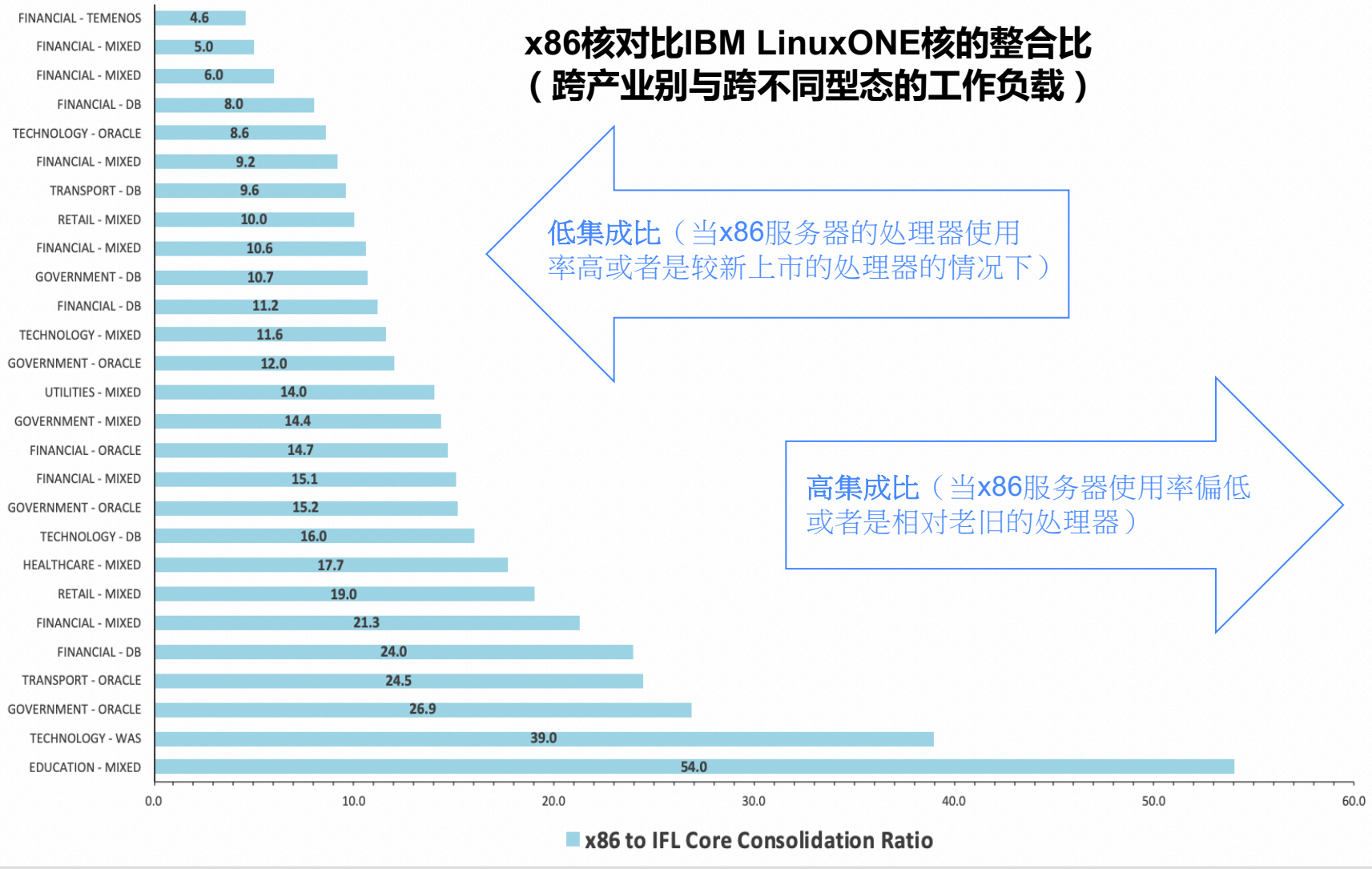
从CPO大数据来观察整合比

从大数据来观察这些真实客户案例得知，平均而言，整合比在大多数的个案符合预期的水平，甚至于有为数不少的案例中，我们观察到更高的整合比。

在整合比其中一个很重要的数据来自于客户生产环境中的真实处理器使用效率，这个部份和分布式服务器x86的科技涵量有很直接的关系。

*本数据呈现来自于29件真实客户的分析报告。 Intel核对比IBM LinuxONE核的整合比分布从4.6：1 to 54：1。

x86核对比IBM LinuxONE核的整合比
（跨产业别与跨不同型态的工作负载）



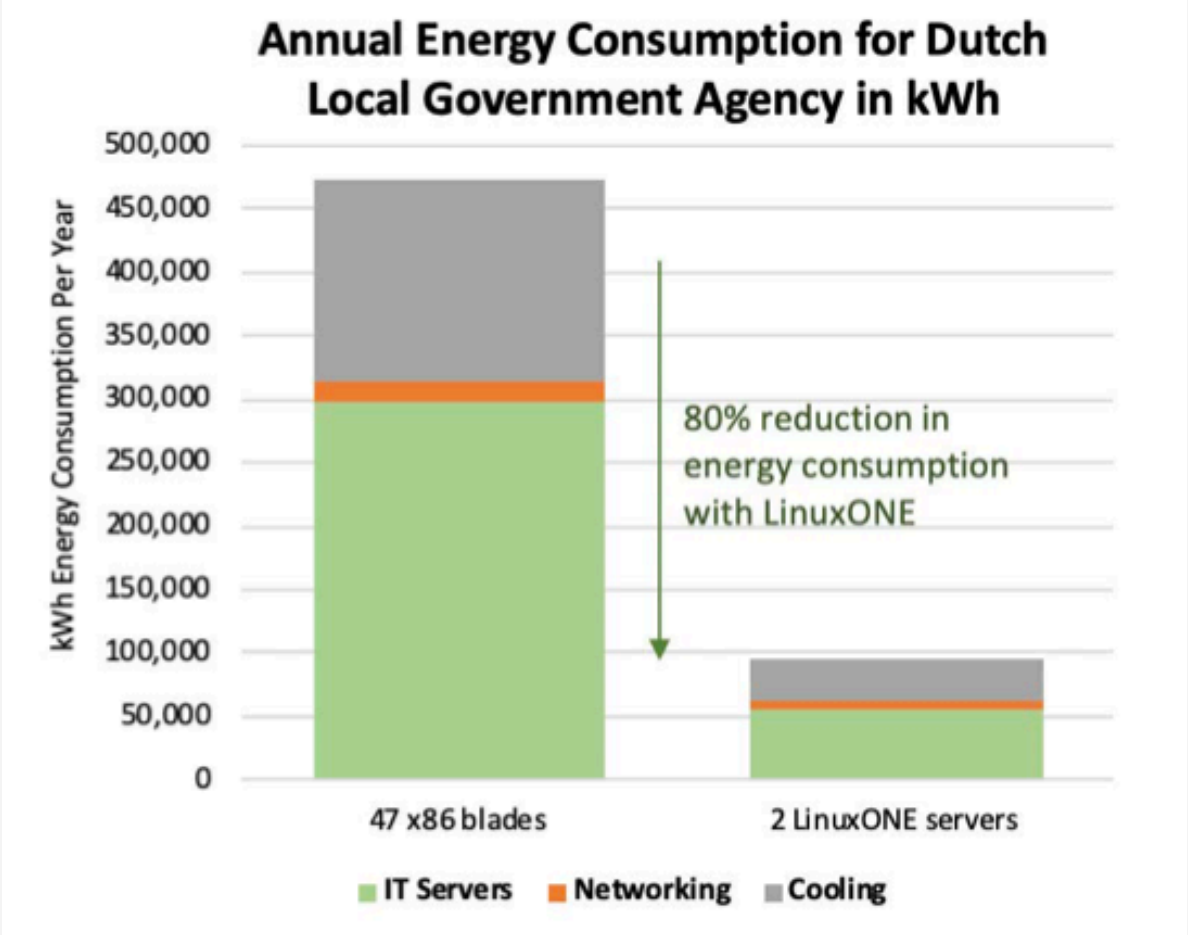
低集成比（当x86服务器的处理器使用率高或者是较新上市的处理器的情况下）

高集成比（当x86服务器使用率偏低或者是相对老旧的处理器）

荷兰某官方机构选择IBM LinuxONE取代现有x86，以合规新的温室气体排放标准

80% 把客户现有的Linux应用从47部x86刀锋式服务器移转至IBM LinuxONE 11颗IFL处理器上，节省了80%的能耗[附注1]

946 五年内减少二气化碳排放量达946吨[附注1]



[1] Energy savings are based on a carbon footprint assessment conducted by the IBM IT Economics team for a government agency in the Netherlands using four blade centers with a total of 47 blades at 8.5 KW (4.5 KW for blades and 4 KW for the chassis based on vendor published KW rates) for an estimated annual server energy consumption of 297,840 kWh versus two LinuxONE Rockhopper I servers with 6 IFLs each at 3.1 KW each, consuming an estimated total of 54,312 kWh annually. Network energy consumption of 2 KW for the blades (two for each blade center for a total of eight) and 1 KW for the LinuxONE servers (two switches for each server), based on vendor published KW rates for networking switches, results in an estimated 17,520 kWh for the blade centers and 8,760 kWh for the LinuxONE servers. Cooling energy consumption is estimated by using an efficiency factor based on the server's architecture and is proportional to the networking and servers' power consumption. In this assessment both blade centers and LinuxONE servers use a data center power utilization effectiveness rate of 1.5 as the factor to calculate cooling consumption, resulting in an estimated 157,680 kWh for the blade centers and 31,536 kWh for the LinuxONE servers. The assessment uses a kWh to CO2 factor of 505.2 grams of CO2 for 1 kWh based on Netherlands CO2 emissions intensity from electricity generation from the European Environment Agency, https://www.eea.europa.eu . Findings from IBM IT Economics assessments will vary according to each client environment.

IBM z/LinuxONE 致力不断提升能源效率的科技创新

右图所示，数据来源来自IBM 信息精算顾问团队协助客户完成的一个以五年为期的信息投资总体成本评估案。.

对比IBM zEnterprise®EC12（zEC12）与IBM z13®主机，新的IBM z13®主机透过科技的创新，可以降低能耗达8%。 新发布的IBM z15 对比IBM z13， 能耗更是高达51%的节省。

更值得一提的是，新的IBM z15导入智能电源供应（iPDU）选项，让选择幅射散热冷却系统Radiator-cooled systems的客户多了一个更加省电的装置选择。

(Source: IBM IT Economic Consulting & research https://www.ibm.com/downloads/cas/K9XD9V1Q)

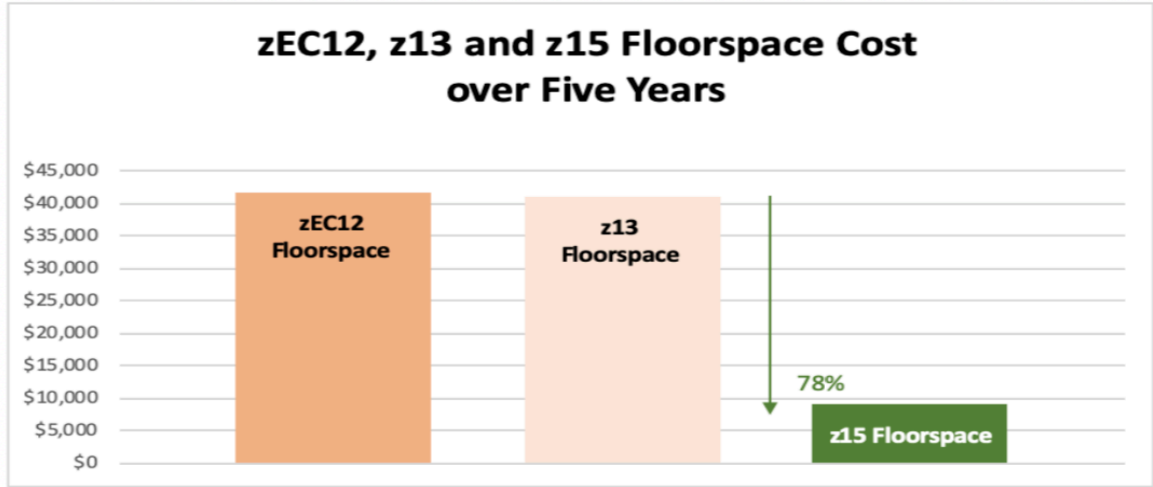
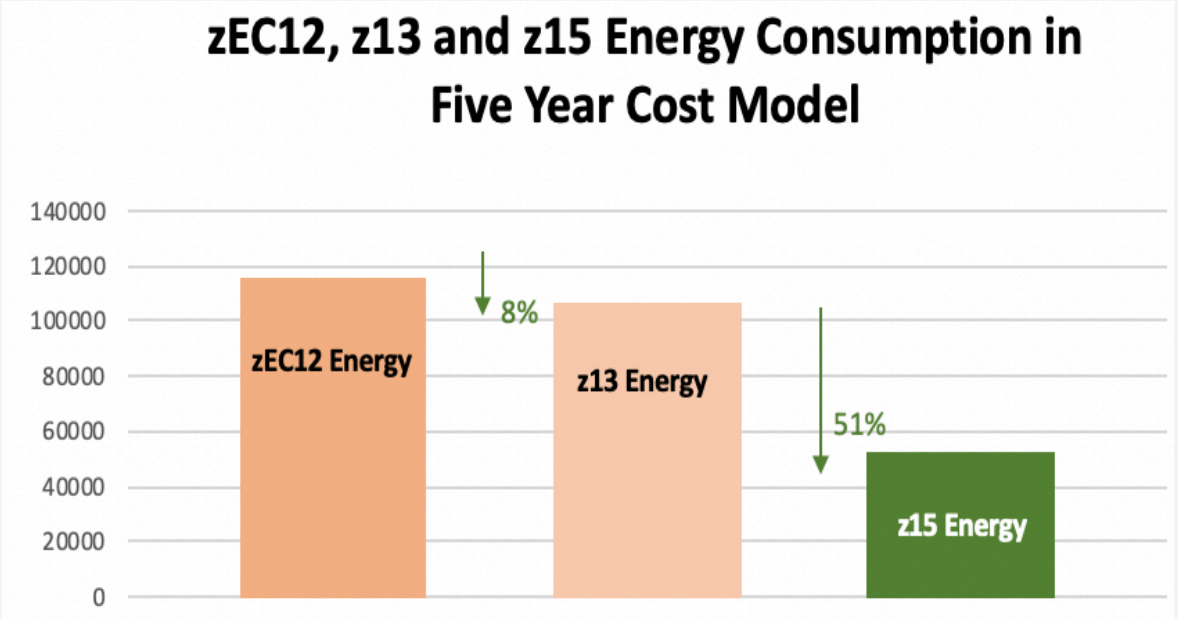


Figure 3: Total floorspace costs over five years for zEC12, z13 and z15



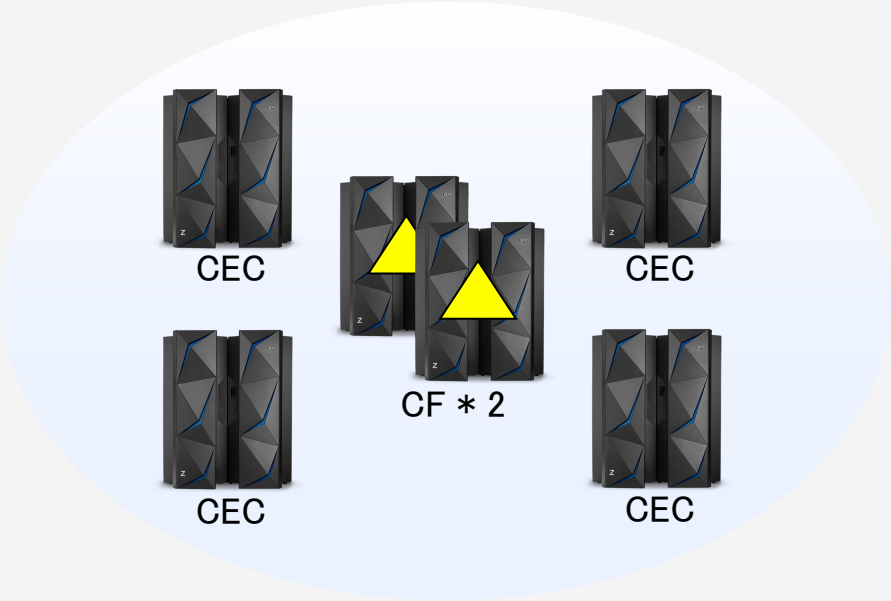
客户个案评估背景为长期的IBM 主机客户，得利于IBM 主机不断地科技创新，因为IBM主机硬/软件的持续精进，IBM主机客户得以直接享受硬/软件创新所带来的好处之外，间接地，客户在能耗的表现也同样地大幅降低。 这种来自于IBM 主机世代交时时，科技创新所带来的火花，实实在在地帮IBM主机客户带来更多的优惠。

新一代的z15提供19寸标准宽度的机柜设计，更符合现代化绿色机房要求。

依左图表说明，相较于zEC12， z13的机柜设计，z15节省了最高达78%的机房楼板面积要求。

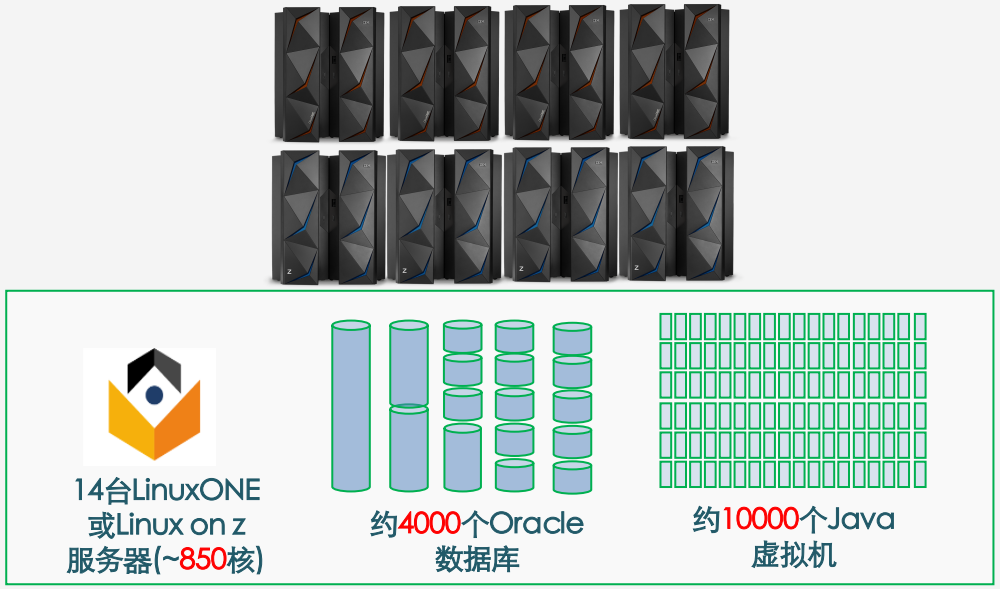
因为这些坚持不懈的创新使得今天我们可以做到

6还是6



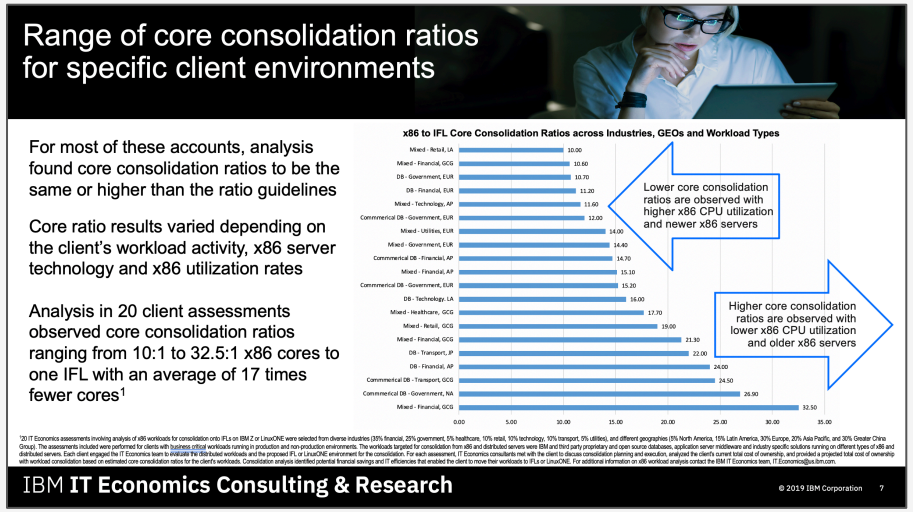
国内z/OS客户最常用的生产集群架构共由6台IBM主机构成, 自2002/2003年以来，虽然客户交易规模增长高达数十倍，但是客户从来无需增加服务器数量，无需增加机房占地空间和配电用电需求，始终保持精简架构简化运维，并有足够可扩展处理能力应对未来业务进一步增长，实现真正绿色计算！

以一顶百

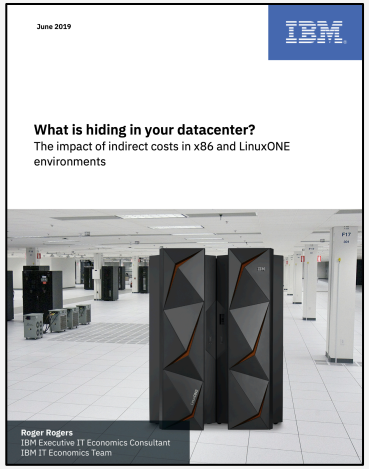


某国际大型人力资源外包公司，利用约14台LinuxONE及主机（约850核）运行ORACLE/WAS/Portal/Cognos/DB2 Connect/QMF/Tomcat等软件产品和应用，支持约4000个ORACLE数据库/10000个Java虚机/4000+容器, 帮助客户大幅节省软硬件和环境成本同时大幅简化运维(如采用x86需采购超过1400台服务器及大量配套设备)

IBM z/LinuxONE + TCO Study 达成降本增效 绿色计算



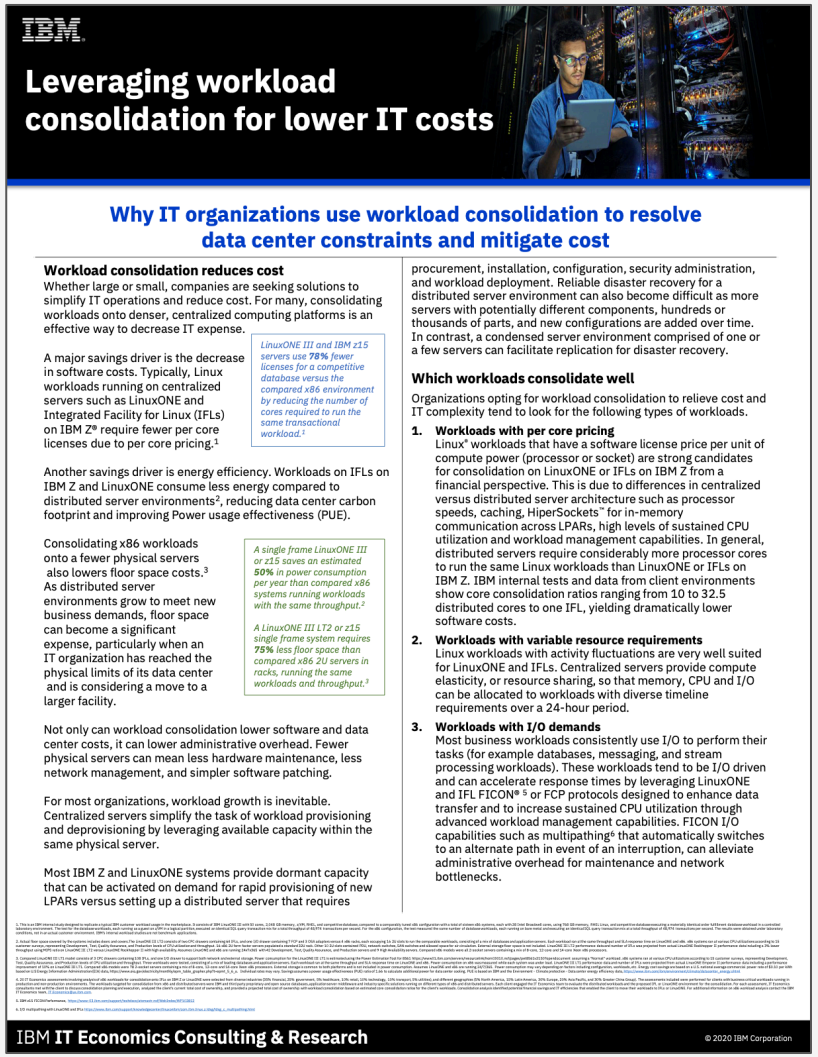
LinuxONE workload core consolidation findings



Indirect costs paper

Labor observations paper

No-charge LinuxONE assessment



Lower IT costs with workload consolidation paper

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