TECHNICAL WHITE PAPER
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VMware Cloud Foundation Total Cost of Ownership (TCO)

The Business Value of VMware Cloud Foundation

vmware by Broadcom

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Today's IT infrastructure needs have evolved significantly, driven by the demands for greater scalability, security, and agility in response to the fast-paced and complex nature of modern business environments. The rigid, siloed nature of traditional infrastructure is ill-suited to the dynamic, fast-paced demands of the modern enterprise, presenting multiple challenges that limit the ability to cost effectively address these critical business requirements.

To remain competitive in this digital-first era, businesses require a modern infrastructure solution that seamlessly integrates and orchestrates modern cloud infrastructure into a cohesive, efficient, and scalable platform.

Customers are finding that **a modern private cloud powered by VMware Cloud Foundation (VCF)** - can deliver the best of both worlds: the agility and scalability of a public cloud with the security, performance, architectural control and cost predictability benefits of an on-premises private cloud.

This white paper explores the total cost of ownership (TCO) and business value of adopting VCF for private cloud environments. It is organized into four main sections, each providing a different lens on the strategic and financial value of VCF.

- **VMware's Portfolio**: An overview of VMware's portfolio, including VMware Cloud Foundation, VMware vSphere Foundation and our vSphere workload engine.
- **Public vs. Private Cloud Economics**: An in-depth analysis comparing the cost of running workloads in public cloud versus private cloud, highlighting that private cloud with VCF offers superior TCO savings and improved cost predictability.
- **Comparative TCO Analysis**: A side by side TCO analysis of VCF and vSphere Foundation compared to traditional 3-tier infrastructure.
- **Customer Story**: A Real-World Financial Impact: Finally, we bring the analysis to life with a customer example. This story illustrates the real world implications of workload placement and how one organization can improve financial performance by shifting from public to private cloud with VCF.

Business Impact at a Glance

Native Public cloud:
3x more expensive than
private cloud

TCO savings with
VMware Cloud Foundation

TCO savings with
VMware vSphere Foundation

Introduction to VMware's Portfolio

VMware has two primary platforms (VMware Cloud Foundation and VMware vSphere Foundation) and the vSphere workload engine.

1. **VMware Cloud Foundation** – a unified private cloud platform that combines the scale and agility of public cloud with security and performance of on-premises infrastructure, delivering increased productivity and lower Total Cost of Ownership (TCO).
   - VMware Cloud Foundation is a full-stack Infrastructure as a Service (IaaS) platform that delivers software-defined compute, storage, networking, security, and management.
   - Integrated automation enables a self-service platform to rapidly deploy VMs/containers for developer agility.
   - Hardened platform offering built-in resilience, scaling, and clustering for non-stop operations.
   - Provides cloud agility to scale infrastructure without scaling staff, delivering cloud consumption on-premises.
   - Provides automation and orchestration to simplify Day 0, Day 1, and Day 2 tasks.
   - Available as a single SKU to simplify full stack deployment.
2. **VMware vSphere Foundation** – an enterprise-grade workload platform for modern infrastructure delivering virtualized benefits, simplified management, cost efficiency, scalability and serves as a pathway to VMware Cloud Foundation.
   - Unified workload platform for running VMs and containers side by side with a native Kubernetes runtime.
   - Intelligent operations management delivers enhanced visibility and infrastructure optimization.
   - Hyperconverged infrastructure integrates compute and storage virtualization for efficient resource management.
   - Simplified deployment and scalability with a single SKU, enabling faster application delivery and future ready infrastructure.
3. **VMware vSphere** – the enterprise workload engine that modernizes compute infrastructure, provides a powerful foundation for modern workloads and enables security and compliance.

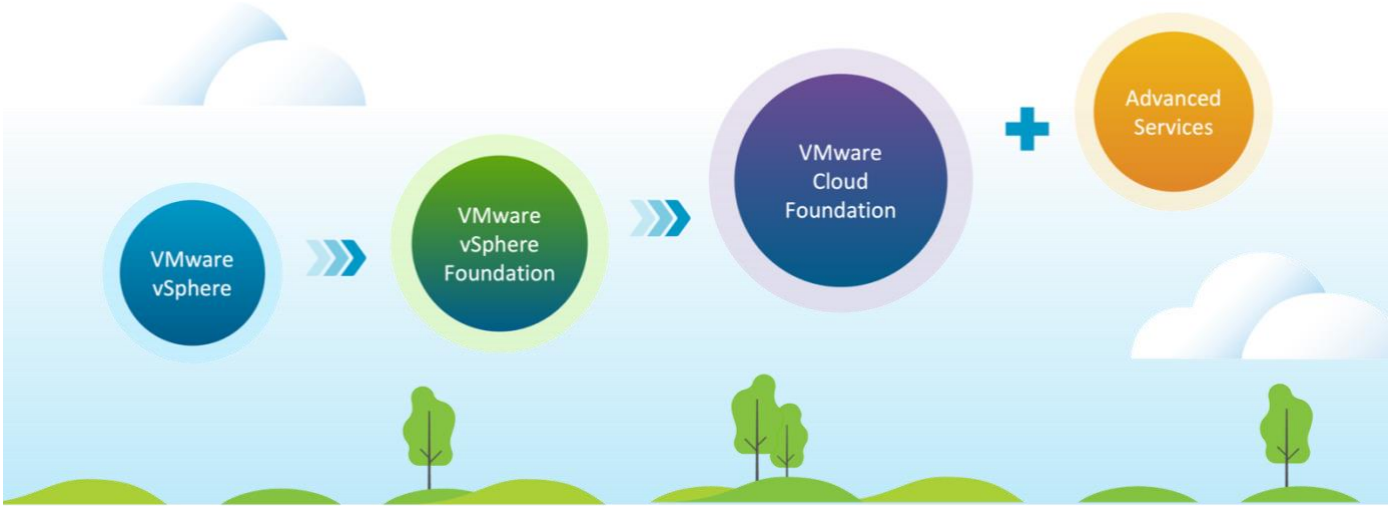


Figure 1: VMware's portfolio

VMware Cloud Foundation Overview

VMware Cloud Foundation (VCF) is the industry's first private cloud platform to deliver public cloud scale and agility with on-premises security, resilience and performance, while lowering total cost of ownership. VCF accelerates customers' digital innovation with faster infrastructure modernization, a unified cloud experience, along with stronger cyber resilience and platform security.

VMware Cloud Foundation delivers a consistent private cloud experience across any environment - whether it's a customer managed data center, edge location or any cloud endpoint. VCF supports traditional as well as modern workloads such as containers and AI/ML. It helps bring modern applications faster to the market and delivers measurable total cost of ownership (TCO) savings, as outlined in this white paper.

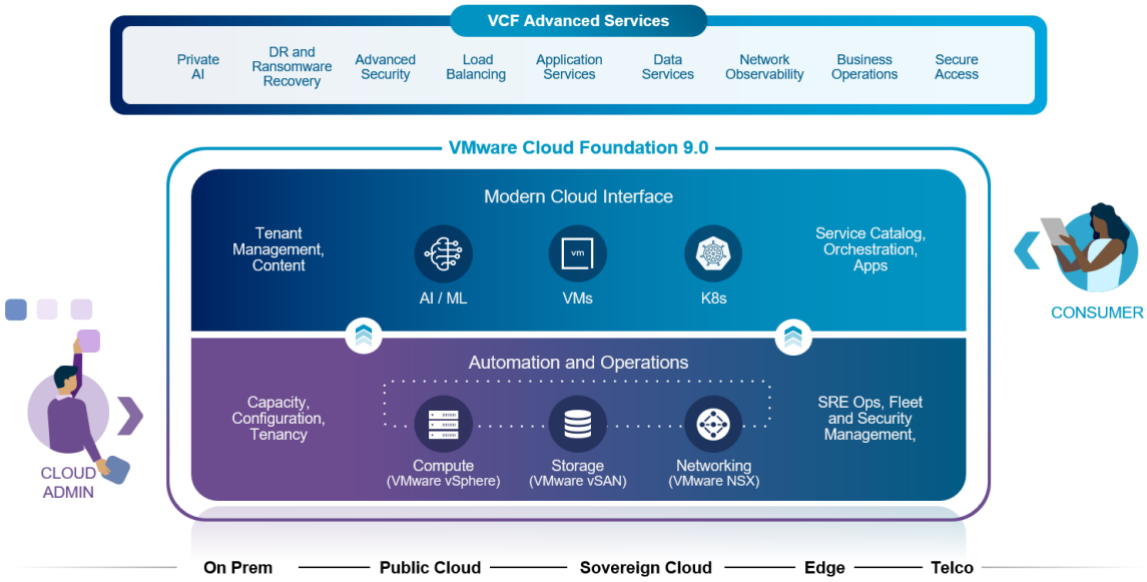


Figure 2: Delivering a modern private cloud platform with VMware Cloud Foundation

VMware Cloud Foundation Benefits

VCF fully enables organizations to deploy a highly utilized full-stack infrastructure platform and deliver the resilience of enterprise-grade software-defined compute, storage, and networking infrastructure on-premises. VCF reduces infrastructure capital costs by fully leveraging standard X86 compute infrastructure, driving utilization rates up, while maintaining the performance, resilience and cybersecurity protection that is expected in an enterprise grade infrastructure platform.

VCF also reduces data center footprint, reducing facility costs in addition to requirements for power and cooling, lowering overall energy consumption to drive higher conservation, resulting in a lower overall carbon footprint.

VCF optimizes operational costs by streamlining and consolidating processes, moving away from siloed organizational models of compute, storage, and networking towards an infrastructure platform where IT teams can work in unison with developers. This approach removes friction through self-service cloud consumption interfaces, empowering developers to work in a highly automated DevOps environment.

VCF enables developers to deploy Infrastructure-as-Code, using APIs and declarative syntax to rapidly achieve business outcomes and deliver new applications to market with 3-5x higher productivity[1].

[1] Enterprise Strategy Group: VMware Tanzu for Kubernetes Delivers for Application Modernization, 2022

Total Cost of Ownership Modeling Overview

The VCF Cloud Economics team conducted three in-depth analyses using data from the actual customer environment.

Costs Categories Included:

The analysis considers the following costs:

Category	Sub-Category
Capital Expense (CapEx)	• **Infrastructure**: Costs associated with server, storage, and network hardware
Operating Expense (OpEx)	• **Hardware Support:** Maintenance costs • **IT Facilities:** Costs related to power, cooling, and floor/rack space • **IT Payroll:** Salaries for full-time employees, labor, and training costs • **VMware Software:** VMware software license and support costs • **Native Public Cloud Services:** the cost of consuming Infrastructure as a Service (IaaS), Platform as a Service (PaaS), storage, data transfer, and support services from hyperscale public cloud providers.

Table 1: TCO cost structure: Capital Expense (CapEx) and Operating Expense (OpEx) Breakdown

Public vs. Private Cloud Economics

In this study, we analyzed the Total Cost of Ownership (TCO) for a typical small environment operating 1,000 virtual machines (VMs). We compared their traditional 3-tier infrastructure, to the same workloads running on the latest generation HCI hardware with a VCF modern private cloud and a native public cloud environment with a similar set of capabilities.

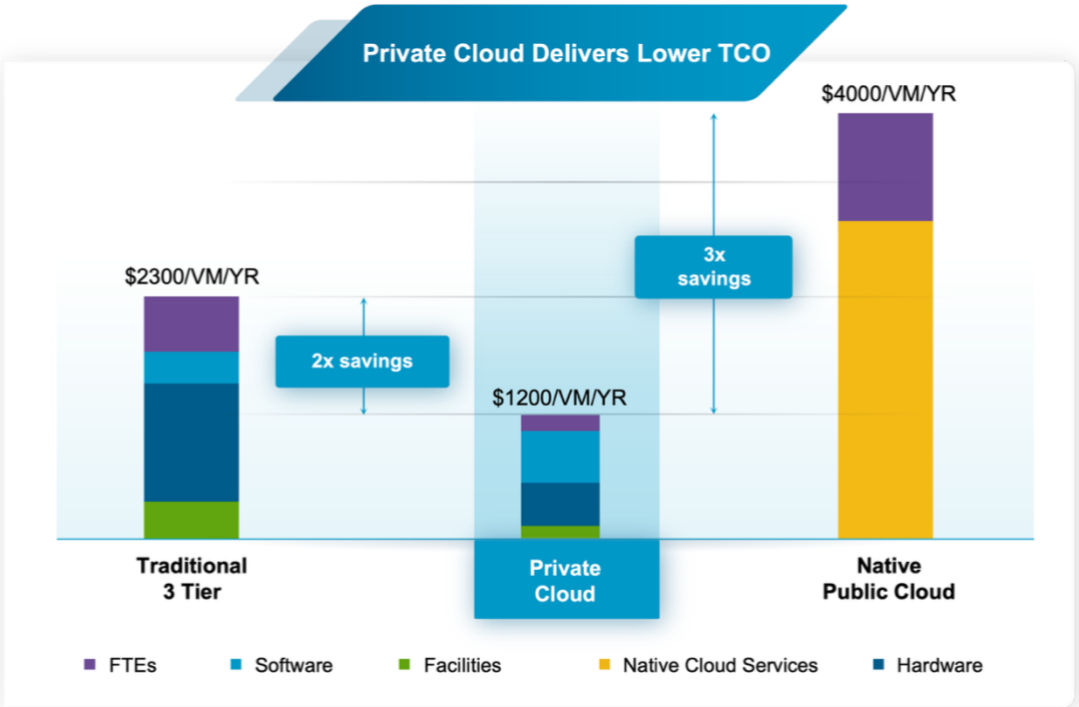


Figure 3: Compares the actual cost against native public cloud and traditional 3-tier infrastructure

Key Takeaways

A comparison of annual Total Cost of Ownership (TCO) per virtual machine shows that the **private cloud model is the most cost effective**, with an estimated cost of $1200 per VM per year. This represents up to **2x savings compared to traditional 3-tier infrastructure**, which costs $2300 per VM, and up to **3x savings compared to native public cloud**[2].

This perspective is echoed by the industry thought leader David Linthicum, who emphasized the long-term financial benefits of private cloud by stating:

> "The long-term TCO of a private cloud often proves more favorable compared to public cloud alternatives[3]."
>
> - David Linthicum,
> Internationally Known AI and Cloud Computing Thought Leader and Influencer

Detailed Breakdown of the Analysis

The below table highlights the Total Cost of Ownership (TCO) of managing 1000 virtual machines across 3 different infrastructure setups.

Key Components Breakdown	Traditional 3-Tier Infrastructure (with vSphere)	Private Cloud (with VCF)	Native Public Cloud
Hardware	$3.3M	$1.5M	-
IT Facilities	$1.4M	$346K	
IT Payroll	$1.5M	$424K	$3.3M
Software	$881K	$1.4M	
Native Cloud Services	-	-	8.8M
Annual Total TCO	**$7 M**	**$3.7 M**	**$12 M**
Annual TCO Per Workload	**$2300/VM/YR**	**$1200/VM/YR**	**$4000/VM/YR**

Table 2: Cost breakdown by Infrastructure

[2] TCO Comparative Model 1.12 | Broadcom Internal Analysis, March 2025

[3] David Linthicum. Private Clouds and their Public Value. February 2025.

Results

Current State - Traditional 3-Tier Infrastructure with vSphere

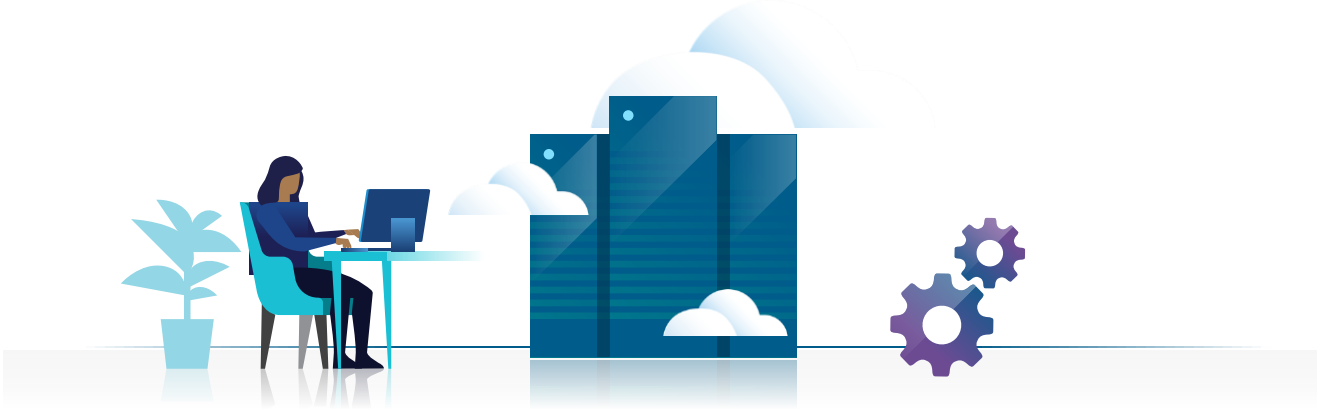
The traditional 3-tier infrastructure incurs a total TCO of $7 million annually and the average cost of a workload is approximately $2300 (per virtual machine per year) when deployed at scale. This setup is resource heavy, with hardware costs alone reaching $3.3 million. It deploys compute, storage, networking and security in silos which increases complexity and requires additional hardware. Facilities cost add another $1.4 million, largely due to inefficient power and cooling requirements. Additionally, the environment demands $1.5 million in IT Payroll costs, driven by manual operations and limited automation - making it a labor-intensive and costly legacy setup.

Native Public Cloud

The native public cloud emerges as the most expensive option, with a total TCO of $12 million - more than three times the cost of a modern private cloud. This is driven by $8.8 million in service-related expenses. Despite removing hardware, software and facility overhead from the customer side, these savings are overshadowed by metered usage costs and variable billing (that includes ingress and egress fees that quickly adds up). Additionally, IT payroll costs remain high at $3.3 million, due to the need for specialized cloud talent and the re-skilling needed to transition to the native public cloud. The average annual cost for a native public cloud is about $4000 per virtual machine.

Private Cloud with VMware Cloud Foundation (VCF)

Upgrading to a modern private cloud with VMware Cloud Foundation (VCF) brings the TCO down to $3.7 million, up to 2x savings compared to traditional 3-tier infrastructure and up to 3x savings compared to a native public cloud. The significant savings come from the reduced hardware, facilities and IT payroll expenses. Private cloud significantly enhance efficiency, primarily due to its simplified architecture, extensive automation, and streamlined operational processes. These factors collectively lead to improved efficiency, better hardware utilization, and reduced IT labor costs. The average annual cost for Private Cloud infrastructure is approximately $1200 per virtual machine.



Comparative TCO Analysis: Software Defined vs. Traditional 3-Tier Infrastructure

In this study, we conducted an aggregate analysis of 138 customer environments, and compared traditional infrastructure versus software-defined infrastructure over a 3-year period, using per-core subscription pricing.

The objective of this comparative TCO study is to provide a comprehensive evaluation of all the costs associated with the acquisition, implementation, operations, and maintenance of the infrastructure over its lifecycle.

In the traditional infrastructure, the analysis considers infrastructure, hardware support, IT facilities, IT payroll, and vSphere enterprise costs.

In the software-defined infrastructure, the analysis considers infrastructure, hardware support, IT facilities, IT payroll and VMware software license subscription fees, based on each scenario (VMware Cloud Foundation, VMware vSphere Foundation).

Key Takeaways

The results show TCO savings of 51% with VCF, 32% with vSphere Foundation compared to a traditional 3-tier infrastructure with vSphere. The below figure shows the breakdown of these savings[4].

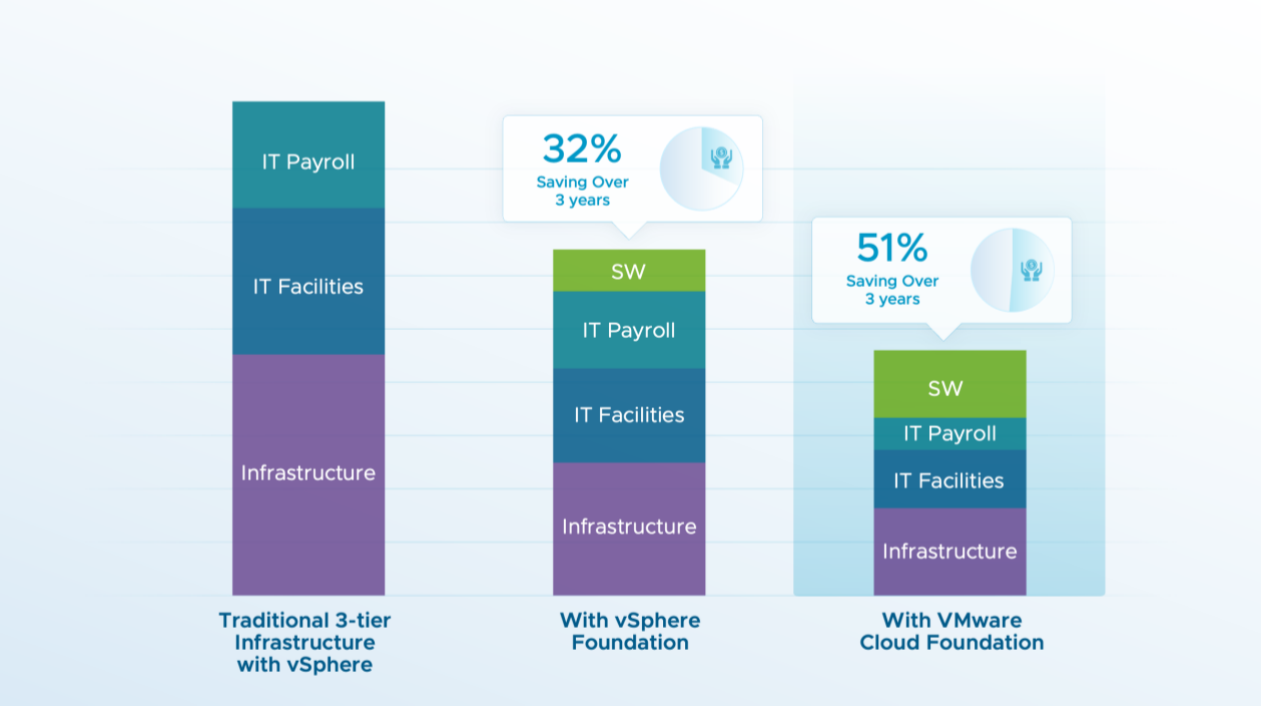


Figure 4: compares the TCO savings of traditional 3-tier infrastructure with VMware's platforms.

VMware Cloud Foundation (VCF) – Full stack VCF delivers 51% TCO savings compared to a traditional infrastructure.

- **Infrastructure** – 55% savings in infrastructure costs. The savings are driven by the reclamation of VMs and increased host server utilization (more VMs per host), which leads to fewer hosts and associated host networking hardware.
- **IT Facilities** – 31% savings in the facilities costs. Reduced hosts lead to lower rack space, power, cooling, and hardware maintenance.
- **IT Payroll** – 42% savings in labor costs driven by automation and orchestration.

[4] VMware Cloud Economics Team. TCO Comparative Model 1.1 - Results based on actual customer environment analysis using core-based subscription licensing when comparing VCF versus traditional 3-tier infrastructure.

The table below shows how each component of VCF impacts TCO savings.

VCF Components	Benefits
Software-defined Compute	• Reduce number of physical servers by virtualizing hardware • Actively managed virtualization in a software-defined data center can substantially reduce host servers by consolidating workloads. • Lower operating expenses (annual vendor support, power, cooling, rack, floor space, etc.) by reducing VM host servers • A software-defined data center (SDDC) with a common operating platform increases server admin productivity through virtualization (less hardware to manage) and better tools to optimize host server utilization.
Software-defined Storage	• Lower hardware costs by shifting from external storage to host server storage • Lower hardware maintenance costs • Less power and cooling required, resulting in lower facilities costs • More flexibility as you are not tied to a specific hardware platform
Software-defined Networking	• Lower up-front hardware costs • Lower reliance on traditional routers, switches, and load balancers • Greater flexibility and adaptability
Management and Orchestration	• Lower energy consumption by better infrastructure consolidation • Improve resource optimization • Improve scalability • Better visibility and reporting capabilities with detailed analytics

Table 3: VCF components and their benefits

VMware vSphere Foundation – delivers 32% TCO savings compared to a traditional infrastructure.

- The savings are driven by incremental virtualization of physical servers, higher infrastructure consolidation, and better operational and management visibility, which shows 45% savings in infrastructure, 36% in facilities, and 27% in labor.

Summary

This TCO analysis demonstrates that moving to software-defined infrastructure with VMware Cloud Foundation (VCF) can dramatically reduce the total cost of ownership. VCF delivers 3-year TCO savings of 51% compared to traditional infrastructure. VCF is the strategic bridge that brings together people, processes, and technology to get the most out of your digital transformation investment.

Customer Story - A Real-World Financial Impact

A leading U.S. healthcare provider undertook a Total Cost of Ownership (TCO) analysis to evaluate the long-term financial impact of running workloads in the public cloud versus maintaining them on-premises. With rising pressure to optimize IT spending, the organization needed clear visibility into where its infrastructure dollars are going.

This analysis revealed that **public cloud was significantly more expensive** on a per-workload basis, potentially costing up to 3 times more than on-premises solutions[5].

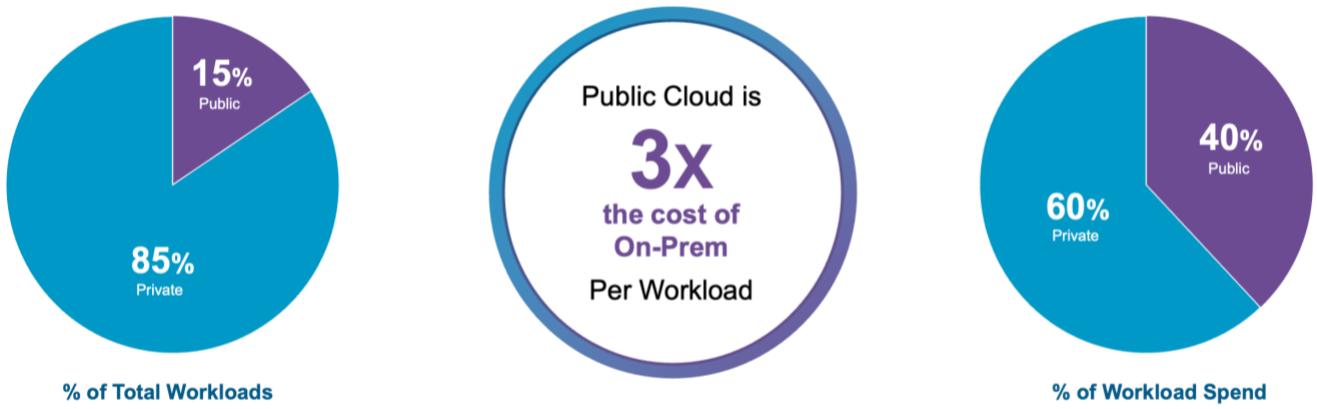


Figure 5: A cost-per-workload comparison between public cloud and on-premises infrastructure for a leading healthcare provider.

Current State: Disproportionate Cloud Costs Relative to Workload Share.

Let's look at how this healthcare provider is currently allocating its workloads and spending. As shown in the image, only **15% of the organization's workloads are running in the public cloud**, while the remaining 85% are still hosted on the private, on premises infrastructure.

However, that small 15% footprint in the public cloud is consuming a **massive 40% of the total IT spend**. Meanwhile, the 85% of workloads running on-premises are responsible for just 60% of the total IT spend.

This shows an imbalance: public cloud, while hosting only a small share of workloads, is consuming a disproportionate amount of IT spending. **Public cloud is approximately three times more expensive than on-premises infrastructure**.

[5] TCO Comparative Model 1.12 | Customer Data & Broadcom TCO Analysis, March 2025

Long Term Impact of VCF - Financial Impact with Different Scenarios

Now, let's examine the financial impact with different scenarios of hosting workloads in the public cloud versus on-premises infrastructure using VMware Cloud Foundation (VCF), as shown in the below figure[6].

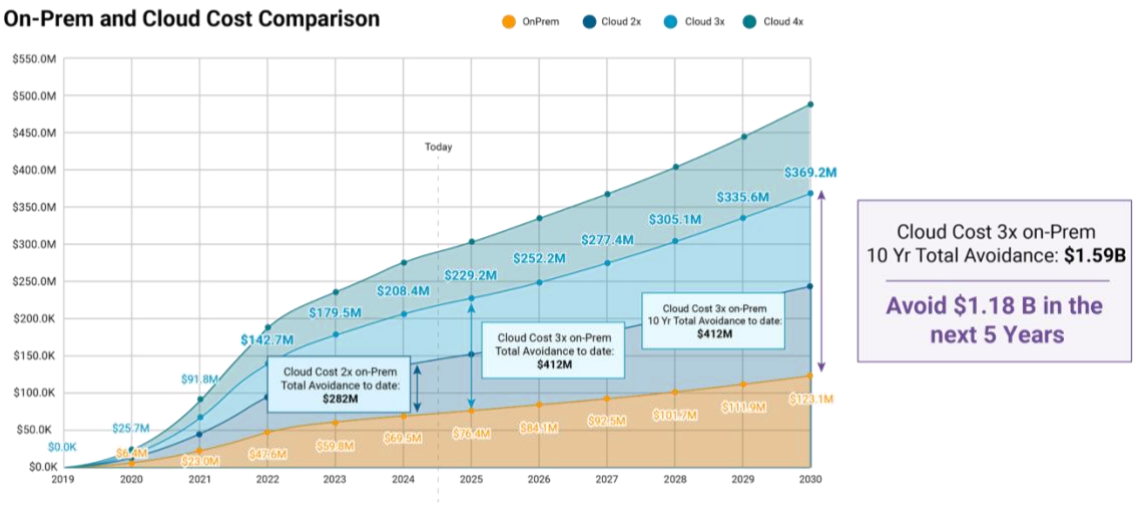


Figure 6: Major Healthcare Provider TCO comparison of Public Cloud vs. On-premises infrastructure with VCF

The analysis includes both historical and forward-looking projections over a 10-year period. It models scenarios where public cloud costs are 2x, 3x or 4x higher than on-premises costs using VCF. The data clearly shows that migrating or retaining workloads on-premises with VCF offers significant cost advantages.

At a 3x cloud cost multiple - a realistic scenario based on current spending patterns - the healthcare provider could avoid up to $1.59 billion in total costs over the 10-year period. Even looking only at the next five years, $1.18 billion in public cloud costs could be avoided by running workloads on-prem with VCF. The cost gap continues to widen over time, emphasizing the long-term financial benefits of utilizing modern on-prem infrastructure with VCF.

Time Period	Cost Avoidance (Cloud 3x vs. On-prem)	Notes
2019 - 2024	$412M	Accumulated savings from 2019-2024
2024 - 2029	$1.18B	Projected savings* if continuing on-premises
2019 - 2030	$1.59B	Total 10 years savings

Table 4: Cost Avoidance: Cloud 3x versus On-Premise Cost

Assumptions: For the purposes of forward looking cost modelling in this TCO analysis, we have assumed a 10% annual growth rate in the infrastructure-related costs. This growth rate applies to both on-premises and public cloud projections.

6 TCO Comparative Model 1.12 | Customer Data & Broadcom TCO Analysis, March 2025

Key Takeaways

- A strategic shift to modern on-premises infrastructure with VCF provides significant long-term savings.
- The longer the workloads stay on public cloud at premium prices, the greater the cumulative cost.
- The cost difference between the public cloud versus on-premises with VCF widens significantly over time, indicating savings are compounded with on-premises infrastructure.

Conclusion

These studies demonstrate a clear financial justification for transitioning from traditional, siloed 3-tier infrastructure or native public cloud to a modern private cloud Infrastructure with VMware Cloud Foundation (VCF).This shift not only reduces complexity and costs, but also enables a consistent cloud operating model across environments. The private cloud modernization with VCF is not just about cost savings, but also about breaking down infrastructure siloes to deliver superior control, predictability and performance.

Next Steps

If your organization is planning your next data center investment or re-evaluating cloud spending, reach out to Broadcom account representatives to schedule a financial impact assessment. For more information visit VMware Cloud Foundation home page

Sources:

- Enterprise Strategy Group: VMware Tanzu for Kubernetes Delivers for Application Modernization, 2022
- TCO Comparative Model 1.12 | Broadcom Analysis, March 2025
- VMware Cloud Economics Team. TCO Comparative Model 1.1. Results based on actual customer environment analysis using core-based subscription licensing when comparing VCF versus traditional 3-tier infrastructure.
- David Linthicum. Private Clouds and their Public Value February 2025.

Disclaimer:

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