SJÚKRAHÚS VERKIÐ

Official tender for Compute, storage, and backup

This document describes main characteristics of HEILSUNET need to offer on this tender. The purpose of this tender is to renew the datacentres at Sjúkrahúsverkið.

Contents

1. Introduction

1.1 Preface

Sjúkrahúsverkið (SHV) is in the process of renewing server and storage in its two datacentres. The HEILSUNET IT environment, which is hosted in the two datacentres, comprises of around 2500 IT users. Employees are divided into several different organizational units, and the geographical spread of these users is divided into several locations across the Faroe Islands, with one location located in Copenhagen, Denmark.

Approximately 1500 of the 2500 users work at SHV, spread across the three hospitals, where the rest of the users belong to Municipal doctors / general practitioners, municipal nursing homes, The Faroese Pharmacy Service, and other public institutions that need access to the National EPJ.

The reason for renewing the HEILSUNET IT infrastructure is attributed to the following:

- The current server and storage infrastructure is nearing its end-of-life, and as such, the warranty period is almost due, and
- With the merger of the three Hospital into one organization, SHV, follows a concentration of server and storage capacity needed to deliver 24/7 IT services to clinical and non-clinical staff
- With strategic ambitions to continually improve healthcare services along with an increased number of employees and complex clinical systems put a drain on current server and storage resources.

1.2 Architectural principles for the HEILSUNET IT environment

The IT department aims for a system architecture that can contribute to realizing the following goals:

Business Continuity: Despite hardware failure, natural disasters, or data corruption, these should not be allowed to disrupt or stop hospital activities or services provided to employees and patients.

Benefit maximization: All decisions about IT must be made based on the benefit of Sjúkrahúsverkið as a whole, which means that the needs and requirements of the organization take precedence over individual departments or individual needs.

Data as an Asset: Data is concrete and an asset to Sjúkrahúsverkið. Since all employees rely on data as a real and measurable resource, it needs to be carefully organized and managed, and simultaneously presented as reliable and accurate.

Data accessibility: Services and data must be able to be deliverable at the right time in the right place to the right extent.

Standardization: The aim is for data to be used across systems, and thus, open standards are employed wherever possible. One goal is for data such as employee information and personal register (p-tal) to be retrieved from common resources.

Scalability: Systems must be expandable to the extent required to meet requirements for larger volumes in production.

1.3 The tender includes

The tender includes the following sections:

Delivery	Includes	Chapter
1	Compute	5
2	Storage and Storage networking	6-7
3	Backup	8
4	Nearline storage (Option)	9
5	Backup storage (Option)	10

2. General requirements

2.1 Preface

This tender condition applies to SHV tender for renewal of the common IT infrastructure, HEILSUNET in accordance with the tender directive in accordance with the tender notice published in *Rundskriv nr. 9003 frá 1. juli 2019 um keyp av vørum og tænastum[1].*

The tender is conducted as a public tender, which means that everyone has the right to submit a tender. The material is based on a functional tender, which means that most of the requirement's specification is written in general terms, and it is left to the tenderer to compile the solution description within the framework of the requirements specification. This gives the tenderer the opportunity to choose the solution that the tenderer finds most suitable in relation to the overall framework of the requirements specification, as well as the minimum requirements described.

2.2 Scope of delivery

The delivery includes the procurement of server, storage, and the necessary licenses for the new HEILSUNET IT platform. The delivery 'Backup' is optional. It is not permitted for the tenderer to make changes to the published tender material.

SHV must receive all offers in PDF, whereas timeframes, calculations and price overviews can be delivered in EXCEL. The offer must be valid for at least three months after the deadline in the timeframe schedule has passed.

Deviation from tender requirements and conditions must be asked for 5 days before the deadline outlined in section 2.3 and is sent as an e-mail to the SHV contact person listed in section 2.5. All deviations are communicated to all suppliers.

The deadline for receiving offers cannot be deviated from. This means that tenders submitted late must be rejected. This hard line is a direct consequence of the principle of equal treatment. Tenders submitted on time will, in turn, be assessed in relation to the selection and award criteria.

If the tenderer has not submitted the information and documentation required, SHV reserves the right to obtain additional information and documentation.

The tender material including any correction sheets, answered question and more is published on the official Faroese purchasing portal, www.gjaldstovan.fo.

---

[1] https://logir.fo/Rundskriv/9003-fra-01-07-2019-um-keyp-av-vorum-og-taenastum

2.3 Tender timeframe

The tender is expected to be completed according to the following schedule in table below. Please note that the expected schedule is an estimate and due to the current Covid19 pandemic, changes might occur.

Date (FO time)	Description
Week 45	Early tender draft sent to suppliers to allow a 'first look' access. Due to Covid19, e-mail correspondence is the only option.
19. Nov. 2021	Date of final tender material is submitted to www.gjaldstovan.fo.
29. Nov 2021 @ 15:00	Deadline for official supplier questions about the tender documents.
3. Des 2021 @ 15:00	Expected SHV publication of potential supplementary documents, information, and answers to supplier questions about the tender documents at www.gjaldstovan.fo.
12. Des 2021 @ 23:59	Deadline for receipt of offers.
13. – 15. Des 2021	Opportunity for each supplier to present the offer (optional). Due to Covid19, only a limited number of representatives from supplier is permitted. Team video conference available and preferred. Supplier needs to make contact to SHV.
Week 50-51	Review and evaluation of offers.
Week 50-52	Contract Negotiation and expected contract offer.
Week 02 (2022)	Expected announcement of award of contract or rejection to tenderers.
2022	Expected delivery / contract start.
2022	Deadline for validity for six months after announcement of award.

2.4 Communication

SHV encourages the tenderer to ask clarifying questions if the tenderer is in doubt about the understanding of requirements, conditions, or the tender material in general.

If the tenderer finds that there are significant inconveniences in the tender material, the tenderer is encouraged to - as soon as possible - make SHV aware of this, and SHV will then consider changing the matter in question, if possible, within the procurement law framework.

SHV would like questions to be listed in the form of a list, indicating the place in the tender material to which the question relates. These questions are sent to SHV's contact person listed in section 2.5

Questions received by SHV contact person before the deadline specified in the schedule for questions to the tender dossier will in any case be answered. Questions received later than 3 days before the expiry of the offer deadline will in principle not be possible to answer as there will be little to no time to react to changes in the tender material.

All questions together with the answers to these in accordance with the deadlines in the schedule will be published in anonymized form at www.gjaldstovan.fo. Questions and answers are then included as part of the tender material. The tenderer is thus encouraged to stay informed about this tender at www.gjaldstovan.fo.

2.5 Contact person

The SHV contact person for this tender is:

Annfinn Thomsen
annfinn.thomsen@ls.fo
+298 235900

2.6 Weighting of tender and decision

SHV takes the right fully or partially to choose between all received offers or to reject them all, and if necessary to create a new tender round. The process is that SHV will go through all received offers and validate them against the overall criteria described in chapter 2. If the offer passes the first validation, the offer will then be validated against the specifics for section (see 1.3). The last step is to make a final decision on validated offers and a supplier is chosen. As a guideline, SHV can freely choose an offer, which has a higher cost, but surpasses other offers in quality and delivery standards.

The following weighting will be used to determine the winner.

Weighting	%	Description
Price	60%	60% price of the offered solution
Solution	30%	15% quality of the solution 5% interoperability with existing infrastructure 5% service and support Agreements 5% the supplier's implementation project, including time and activity plan, test and project organization
Supplier	10%	5% staff qualification / vendor certifications level 5% references of similar solutions

2.7 Purchase agreement

The purchase agreement consists of hardware (server & storage), all software/licenses and consultant work needed to implement the new solution.

Area	Description
Agreement	A specific purchase agreement will be made between the tenderer and supplier when SHV has made the final decision.
Length in years	The purchase agreement, e.g., warranty period must be five years. The supplier needs to provide a guarantee that it is possible for SHV to extend the warranty period by two times, twelve months under the same conditions as the initial agreement.
Payment	To be agreed
Cost	SHV requires cost for each item separate for each section, as well as a total cost including delivery, toll, and other extra cost. All prices must be listed without MVG/MOMS.

2.8 placement

Site	Location	Description
Site-A	Building H, H-2	Primary datacentre which includes server, storage, and backbone networking.
Site-B	Building B, B221	
Site-C	Building G, G5	Witness site

2.9 Overall minimum requirements

The following table shows some of the overall requirements that apply for all sections. In addition, a minimum requirement list is made available within each section, and suppliers are advised to reference these minimum requirements when they send in their offer. If more than one solution or variants are offered, suppliers need to clearly mark these as separate solution A, solution B and so forth.

Area	Description
Quality	A specific purchase agreement will be made between the tenderer and supplier when SHV has made the final decision.
Equipment	The purchase warranty period must be five years. The supplier needs to provide a guarantee that it is possible for SHV to extend the warranty period two times, twelve months intervals under the same conditions as the initial agreement.
Labelling	All equipment, cables, etc. must be labelled and documented pending further agreement.
Installation	All equipment, cables, etc. must be installed properly in accordance with recommended supplier whitepapers, so that it is easy to gain access and conduct necessary maintenance.
Cables	Cables must follow common *Standards for Data Centers* (Supplier must explain). Specific colour for specific purposes is preferred.
Electricity	Equipment must be grouped in accordance with electricity sources and groups.
Transceivers	The entire HEILSUNET network is based on Cisco, thus transceivers must be Cisco or fully supported / compatible with Cisco equipment.
Remote Access	IPMI or similar must be installed and configured through dedicated RJ45 ports.
Licenses	Complete overview of all licenses required to implement the solution, including calculations and considerations, e.g., license optimization.
Monitoring	The supplier is requested to make recommendation on monitoring of the solution. SHV uses SolarWinds and has the necessary license to monitor the entire stack (VMware, storage, compute, network, etc.).
Staff qualification	The supplier must provide documentation of qualification (staff) necessary to implement the proposed solution. References to similar solutions is also welcomed.

|	
Supplier	SHV is looking for an international strong supplier of the solution. If not locally present in the Faroe Island, e.g., Danish suppliers, we encourage these suppliers to form partnerships with Faroese companies, however, this is not a requirement. Danish suppliers, who deliver a solution directly, are required to state how they will undertake the needed service/support to fulfil the requirements. SHV is looking for a supplier with references to healthcare in Northern Europe and Scandinavia.
Processes and procedures	It is vital that both the supplier and SHV technical staff have operative knowledge of the solution, in day-to-day operation as well as in change management and time of emergency.
Single point of failure (SPOF)	One of the architectural goals of the IT environment is Business Continuity. Supplier must point out and explain any possible SPOF with the proposed solution.
Project management and description	As part of the offer, a complete project description including timeframes, implementation steps, and resources must be included.
Test period	The implementation must include a test of failover and fallback between the sites. Failover processes must be documented and handed to SHV.
Documentation	As part of the offer, a complete technical documentation needs to be included. The technical documentation must include both words/descriptions and drawings. Post implementation, a descriptive documentation that fits SHV environment must be completed. The post implementation work includes documentation on troubleshooting processes, etc.
Delivery	The tenderer must include delivery times for all including hardware, software, and licenses

3. Current setup

The current setup has two production sites, and the configuration is in accordance with VMware vSphere VMSC[2] requirements, considering the layout of the sites.

Compute resources are evenly split between the sites, and the storage is a sync-replica between the sites. The current failure criteria are that 1 site + 1 compute host can fail, and the replanning infrastructure can still do a full vSphere HA failover. The setup consists of in total three sites:

- 2 production sites
- 1 witness site

The following diagram is a conceptional layout of the setup.
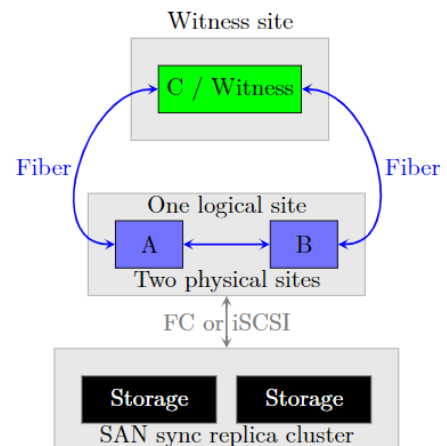
3.1 Compute

The compute infrastructure consists of one cluster with two compute segments: a *general compute* and a *SQL compute*. All compute servers are currently HPE ProLiant.

3.1.1 General compute

The *general compute* cluster has a total of the following specification:

- CPU: 8x dual-socket Xeon 2650v4[3] nodes
- Memory: 8 TB

3.1.2 SQL compute

The *SQL compute* cluster has a total of the following specification:

- CPU: 2x dual-socket Xeon 2637v4[4] nodes
- Memory: 1,5 TB

3.2 Storage

The current storage infrastructure consists of 2 independent solutions, one flash based (Sata SSD) and one Nearline based.

3.2.1 Flash

The flash storage is a HPE 3PAR and is the primary storage solution. All data, with a few exceptions, is stored in this cluster. The flash-based storage is connected to two dedicated 16Gbps FC fabrics, each of these are connected to a peer on the other production site. Each compute node is connected to the storge with a DP FC HBA, with one link to each FC Fabric.

Primary storage consumption is today ≈102 TB, seen from vSphere.

3.2.2 Nearline

The nearline storage is an EMC ISILON solution with a sync replicate between the two primary sites. The data stored on the nearline is mostly cold or archive data where limited availability, at times, has been acceptable. Nearline storage consumption is today ≈100 TB.

---

[2] https://core.vmware.com/resource/vmware-vsphere-metro-storage-cluster-vmsc

[3] https://en.wikipedia.org/wiki/List_of_Intel_Broadwell-based_Xeon_microprocessors#Xeon_E5-2650_v4

[4] https://en.wikipedia.org/wiki/List_of_Intel_Broadwell-based_Xeon_microprocessors#Xeon_E5-2637_v4

4. New setup descriptions

4.1 General

- all compute nodes must include IPMI capabilities with console access,

- all required licensing from day 1 (Must be explained),

- failure requirement is 1 site and 1 compute node in remaining site(s),

- the tenderer must try to optimize sockets and cores for optimal licensing costs, and

- this includes licensing for. Microsoft Windows Datacentre, MSSQL, VMWare and Veeam.

4.2 Sites

SHV wish to continue to use site A and B as production sites, as well as to use site C as a dedicated witness site. That said, site C does have physical and cooling capacity, allowing for some operations in addition to strict witness services. This ability is reserved for a potential DR setup, at a later point in time. Site C witness node is expected to be connected directly to the network equipment in A and B, via the fibre ring.
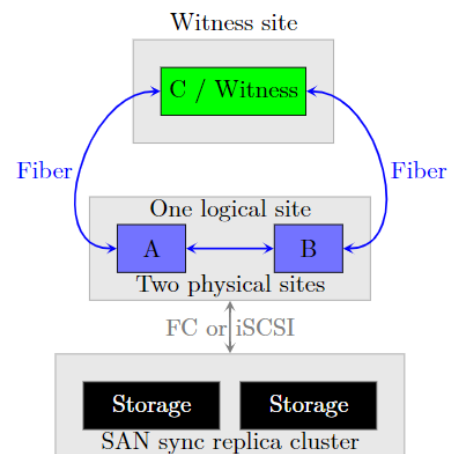
4.3 Compute

The segmentation of computing is still necessary and is attributes to Microsoft SQL Enterprise license costs. In addition to the *general compute* and *SQL compute*, SHV wishes to add another segment dedicated to remote desktop services (RDS). The reason behind this decision is that the IT department sees an increased load on CPU where remote desktop servers reside within the *general-purpose* segment. Separating RDS will allow general-purpose servers to regain much needed CPU, while also provide the necessary CPU to RDS users.

SHV will also implement a new Avaya virtual PBX solution. This solution will also have its own dedicated compute segment.

As with the current setup, all compute notes will be part of the same VMware cluster.

4.4 Storage

The tender primarily includes the primary storage as SHV plans to still use the ISILON nearline storage short term. However, the suppliers are welcome to make a bid as an option on a nearline storage solution.

Suppliers are also free to determine whether the size of the primary storage should be vastly increased, eventually to compensate for ISILON, or if the primary storage size should be kept to a minimal level according to the requirements.

5. Compute

The compute segments include the following number of compute nodes:

Pr. site	Segment	Total	Description
4	General compute	8	Compute nodes dedicated to general-purpose
2	SQL compute	4	Compute nodes dedicated to SQL
3	RDS compute	6	Compute nodes dedicated to RDS
2	PBX compute	4	Compute nodes dedicated to Avaya PBX
1 (site C only)	Witness compute	1	Note! This compute node is placed on site C

5.1 Minimum requirements for all hosts

Type	Description	Minimum requirements
Chassis	Model	Information must be provided
	Rack unit	Information must be provided
CPU	Manufacturer	Manufacturer can be either Intel or AMD
RAM	Relative performance	> 95%
	DIMM size	Tenderer must ensure that RAM capacity can be doubled later. Tenderer must also include info about max RAM pr host
	Features	ECC
POWER	Pr. Unit	2
	Failure tolerance	n-1
	Watt	Information must be provided
	BTU	Information must be provided
	Features	Hot plug
Networking	Network card * interfaces	2*2 25Gbps
	Hardware interfaces	SFP28
	Protocols	Ethernet
	Interface speed	25 Gpbs
	Patch cables	4 Cisco DAC cables 1 RJ45 to OOB/IPMI
OS		ESXI
OS SSD	Disks	2
	Capacity	>OS requirements (Must be explained)
	Redundancy	Hardware mirror / Raid 1
IPMI	Interface type	Dedicated RJ45
	ISO Mount via WebUI	Persistent
	Console access via WebUI	Persistent
	Monitoring protocol	SNMP v2c & v3

5.2 Dedicated SQL hosts

SHV is using MSSQL Enterprise with SA. The tenderer must try to optimize licensing costs for this environment.

- Current CPU per host Dual-socket Xeon 2637v4 @3.5GHz
- Current Memory per host 768 GB

5.2.1 Minimum requirements for SQL hosts

Type	Description	Minimum requirements
Chassis	Pr. Site / Total	2 pr site / Total 4
CPU	Sockets	Information must be supplied
	Cores pr. Host	32
	Core frequency	3.5 GHz
RAM	Size	1 TB
Storage Networking	Network interfaces	2*FC16 or 2*SFP28
	Hardware interfaces	FC16 or SFP28
	Protocols	Fibre Channel or Ethernet
	Interface speed	16Gbps or 25Gbps
	Patch cables	2 Cisco DAC cables

5.3 Dedicated General purpose hosts

Today SHV is using the same hosts for RDS and general-purpose usage but want to change this to separate compute sections.

5.3.1 Minimum requirements for dedicated general-purpose hosts

Type	Description	Minimum requirements
Chassis	Pr. Site / Total	2 pr site / Total 4
CPU	Sockets	Information must be supplied
	Cores pr. host	16
	Core frequency	3.2 GHz
RAM	Size	1 TB
Storage Networking	Network interfaces	2*FC16 or 2*SFP28
	Hardware interfaces	FC16 or SFP28
	Protocols	Fibre Channel or Ethernet
	Interface speed	16Gbps or 25Gbps
	Patch cables	2 Cisco DAC cables

5.4 Dedicated RDS hosts

SHV wants to dedicate compute host for RDS purposes only.

5.4.1 Minimum requirements for Dedicated RDS hosts

Type	Description	Minimum requirements
Chassis	Pr. Site / Total	3 pr site / Total 6
CPU	Sockets	2
	Cores pr. Sockets	24
	Core frequency	3.2 GHz
	CPU Reservation	225 GHz* ≈1.5
	vCPU Reservation Pr. Site	312
RAM	Size	1 TB
Storage Networking	Network interfaces	2*FC16 or 2*SFP28
	Hardware interfaces	FC16 or SFP28
	Protocols	Fibre Channel or Ethernet
	Interface speed	16Gbps or 25Gbps
	Patch cables	2 Cisco DAC cables

5.5 Dedicated PBX hosts

SHV will be implementing Avaya virtual PBX solution. The virtual machine usage is explained in the following two documents which are resource usage pr. site (A+B).

Virtual Application	Virtual Platform	QTY VMs	Release	vCPU	Minimum CPU	CPU Reservation	Memory Reservation	Hard Disk Allocation	vNICs
CM8.1 30K Users (2 VE Servers Required)	VMWare	1	8.1.3	3	2,17 GHz	6,51 GHz	5,12 GB	64 GB	3
AAMS 8.0 (AAMS for Aura 8.x)[Profile-1 550-MPU]	VMWare	1	8.0.2	4	2,19 GHz	8,76 GHz	4,608 GB	52 GB	2
SMGR8.1 Profile-2 (250K users, 250-BSM, 12SM)	VMWare	1	8.1.3	6	2,19 GHz	13,11 GHz	12,288 GB	105 GB	1
SM8.1 Profile 2 up to 4.5K devices	VMWare	1	8.1.3	5	2,2 GHz	5,5 GHz	7,376 GB	90 GB	4
AADS 8.1 Profile-2 4.5K devices	VMWare	1	8.1.3	8	1,15 GHz	9,2 GHz	10,24 GB	250 GB	1
ASBCE 8.1 SBC Medium (thick)	VMWare	1	8.1.2	4	2,2 GHz	9,6 GHz	8 GB	160 GB	6
ASBCE 8.1 EMS (Management)(thick)	VMWare	1	8.1.2	3	2,2 GHz	7,2 GHz	8 GB	160 GB	2
PS8.1.0-Breeze3.7 Profile-3 up to 1K (User/Sessions 1-VM)	VMWare	1	8.1.3	6	2,4 GHz	14,4 GHz	10 GB	150 GB	1
Breeze3.8 Profile-4 Flexi	VMWare	1	3.8.0	8	2,2 GHz	17,6 GHz	16 GB	150 GB	2
WebLM Standalone 8.1 Profile-1	VMWare	1	8.1.3	1	2,2 GHz	2,185 GHz	1 GB	40 GB	1
ADS3.2 (SAL Gateway Only) Recommended	VMWare	1	3.1.0	4	2 GHz	8 GHz	6 GB	140 GB	2
Totals		**11**		**52**	**2,4 GHz**	**102,065 GHz**	**88,632 GB**	**1361,00 GB**	**25**

Virtual Application	Virtual Platform	QTY VMs	Release	vCPU	Minimum CPU	CPU Reservation	Memory Reservation	Hard Disk Allocation	vNICs
CM8.1 30K Users (2 VE Servers Required)	VMWare	1	8.1.3	3	2,17 GHz	6,51 GHz	5,12 GB	64 GB	3
AAMS 8.0 (AAMS for Aura 8.x)[Profile-1 550-MPU]	VMWare	1	8.0.2	4	2,19 GHz	8,76 GHz	4,608 GB	52 GB	2
SMGR8.1 Profile-2 (250K users, 250-BSM, 12SM)	VMWare	1	8.1.3	6	2,19 GHz	13,11 GHz	12,288 GB	105 GB	1
SM8.1 Profile 2 up to 4.5K devices	VMWare	1	8.1.3	5	2,2 GHz	5,5 GHz	7,376 GB	90 GB	4
AADS 8.1 Profile-2 4.5K devices	VMWare	1	8.1.3	8	1,15 GHz	9,2 GHz	10,24 GB	250 GB	1
ASBCE 8.1 SBC Medium (thick)	VMWare	1	8.1.2	4	2,2 GHz	9,6 GHz	8 GB	160 GB	6
PS8.1.0-Breeze3.7 Profile-3 up to 1K (User/Sessions 1-VM)	VMWare	1	8.1.3	6	2,4 GHz	14,4 GHz	10 GB	150 GB	1
Breeze3.8 Profile-4 Flexi	VMWare	1	3.8.0	8	2,2 GHz	17,6 GHz	16 GB	150 GB	2
Totals		**8**		**44**	**2,4 GHz**	**84,680 GHz**	**73,632 GB**	**1021,00 GB**	**20**

5.5.1 Minimum requirements for Dedicated PBX hosts

Type	Description	Minimum requirements
Chassis	Pr. site	2 pr site / Total 4
CPU	Sockets	Information must be provided
	Cores pr. Host	16
	Core frequency	3.2 GHz
	vCPU count	≈50
	CPU Reservation	162 GHz*≈1.5
RAM	RAM	96 GB
	Memory Reservation	64 GB
Storage Networking	Network interfaces	2*FC16 or 2*SFP28
	Hardware interfaces	FC16 or SFP28
	Protocols	Fibre Channel or Ethernet
	Interface speed	16Gbps or 25Gbps
	Patch cables	2 Cisco DAC cables

5.6 1 Witness Server

The Witness server will be located at site C and will host Quorum applications

5.6.1 Minimum requirements for Witness server

Type	Description	Minimum requirements
Chassis	Model	Same architecture as VMware hosts
	Pr. site	Only site C
CPU	Sockets	1
	Cores pr. Sockets	8
	Core frequency	3.2 GHz
RAM	RAM	64 GB
Networking	Latency	Witness server requires low latency 5 ms RTT (MAX)
Storage	Size	2TB (Usable by host)
	Type	Local ALL FLASH
	RAID Type	HW RAID 6
	Redundancy	Must be able to lose 2 disks must include 1 Hot spare
Software	VMWare	Standard

5.7 VMWare

5.7.1 Licensing

SHV will be reusing VMWare licenses that become available when the old hardware is replaced.

Tenderers can use these in their bid.

5.7.2 Current VMWare licenses

Product	Usage	Capacity	State	Expiration	Support Contract
VMware vSphere 6 Enterprise Plus (CPUs)	16 CPUs	16 CPUs	Assigned	Never	Under support contract
VMware vSphere 6 Hypervisor (CPUs)	0 CPUs	Unlimited CPUs	Unassigned	Never	Under support contract
VMware vSphere 6 Enterprise Plus (CPUs)	4 CPUs	4 CPUs	Assigned	Never	Under support contract
VMware vSphere 6 Standard (CPUs)	4 CPUs	8 CPUs	Assigned	Never	Under support contract
VMware vCenter Server 6 Standard (Instances)	1 Instances	1 Instances	Assigned	Never	Under support contract

5.7.3 Available VMWare licenses to tenderer

Product	Usage	Capacity	State	Expiration	Support Contract
VMware vSphere 6 Enterprise Plus (CPUs)	0 CPUs	16 CPUs	Unassigned	Never	Under support contract
VMware vSphere 6 Hypervisor (CPUs)	0 CPUs	Unlimited CPUs	Unassigned	Never	Under support contract
VMware vSphere 6 Enterprise Plus (CPUs)	0 CPUs	4 CPUs	Unassigned	Never	Under support contract
VMware vSphere 6 Standard (CPUs)	3 CPUs	8 CPUs	Assigned	Never	Under support contract
VMware vCenter Server 6 Standard (Instances)	0 Instances	1 Instances	Unassigned	Never	Under support contract

5.7.4 Minimum requirements for VMWare vCenter

vCenter HA is not implemented today, but this needs to be implemented in the new infrastructure.

Type	Description	Minimum requirements
Features	VCHA	Must be configured
	vDS with NIOC	Required
	DRS	Required

6. Storage

6.1 Minimum requirements for Storage

Type	Description	Minimum requirements
Chassis	Sites	2
	Pr. Sites	Information must be supplied
	Rack units	Information must be supplied
Hardware and performance	Usable space	200 TB seen from vSphere environment (without compression and deduplication)
	Storage type	ALL FLASH
	Net interface	iSCSI, FC
	Net ports	If iSCSI, the ports must be 25Gbps. If FC the currently installed infrastructure can be used, and all licensing must be included.
	Disk expanding	Solution needs to handle an expansion of 20% year over year. The tenderer must provide an explanation on how storage capacity can be increased over a 5-year time span.
	Read/write intensity	Approximate evaluation 50 / 50 - read / write
	Patch cable	DAC cables. (Information must be supplied) 1 RJ45 to OOB/IPMI pr. Controller
Replication	Synchronous	Transparent to vSphere or configured similarly for vMSC
	Uniform vs Nonuniform	Must be explained and what is used
Power	PSU pr. unit	2
	Failure tolerance	n-1
	Features	Hot plug
	Watt	Must be explained
	BTU	Must be explained
Migration	Perform	It is the tenderers' responsibility to ensure that VMWare environment works as it should after the migration
	Equipment	It is the tenderers' responsibility to have the necessary tools or hardware to perform the migration

In case of future expansion of storage hard disk space, suppliers need to account for "max price for TB". Meaning suppliers must guarantee the same initial price when expanding the storage.

7. 7. Storage networking

7.1 General

Current storage network is FC 16Gbps, the tenderer is allowed to reuse current storage network but must account for and include licensing for the additional FC ports in current switches.

SHV would prefer to switch to ISCSI and if so, it is up to the tenderer to offer the most suitable high-end switches for this purpose. All Ports, Licenses and configuration must be explained.

Current Network infrastructure at SHV runs on Cisco Nexus 9300 Switches.

If switched to ISCSI minimum required storage network port speed is 25Gbps to locally connected equipment. Minimum of 2 100Gbps ports on each switch for Uplink between sites.

7.2 Current FC network

There are currently 2 HPE SN3000B FC switches at each site 4 in total.

They are configured to be redundant and currently 12 ports are free in each switch.

The free ports are currently not licensed, and tenderer must ensure that all required licenses are included if these Fibre channel switches are reused.

8. Backup

SHV is using Veeam as their primary backup solution and would prefer to continue using this.

The tenderer must ensure that all sockets/cores will be licensed.

Current licenses: Veeam Backup & Replication Enterprise Plus 24 Sockets

Description	
Currently used sockets	23
Used sockets for outgoing HW pertaining to this bid	21
Free sockets to be used by new HW	22

9. Nearline storage (option)

The current EMC ISILON is nearing its end of life, however, as the storage is in good conditions and harddisk drives are in good shape, the life expectancy is still a couple of years. Any offers on nearline storage is optional and SHV decides whether to move forward with the offer, or partly or fully decline it.

No exact feature description will be listed, however, SHV expect the feature list to be minimum featues of the EMC ISILON storage, including repliaca feaures as the need for one NAS in each datacentre is required.

Current nearline storage consumption is ≈100 TB.

10. Backup storage (Option)

10.1 Current backup storage

The current Veeam Backup & Replication software that is distributed over Site A and Site B. Where on Site C is holding the Copy jobs.

Site A and site B have this hardware setup:

- Repository in site A and B are in a Scale Out Repository

- 1 Veeam proxy on each site
  - 2x 16 FC link to datastore
- 1 backup storage with 140 TB capacity on each site
  - Usable capacity 140 TB
  - 2x1Gb uplink

Site C has this hardware setup:

- 1 backup storage with 140 TB capacity
  - Usable capacity 140 TB
  - 2x1Gb uplink

10.2   Backup jobs

SHV has this backup job today. Some of them run several times a day, and others run daily, weekly, and monthly. The copy job runs continuously.

Table below describes the jobs today with a 10% and a 20% growth for the next 5 years. We have used the Restore Point Simulator[5] to calculate. To have the necessary backup storage it is up to the tenderer to offer the most suitable storage for the purpose.

Backup Job	Total Today	Total with 10% growth in 5 years	Total with 20% growth in 5 years
Profile_p2_VEEAM_BACKUP_CatchAll	15500,25 GB	24577,92 GB	36834,78 GB
Profile_p3_VEEAM_BACKUP_1month	3741,00 GB	6024,19 GB	9306,64 GB
Profile_p4_VEEAM_BACKUP_1week	9836,75 GB	15309,40 GB	22030,00 GB
Profile_p5_VEEAM_BACKUP_24hour	64060,00 GB	99980,00 GB	151410,00 GB
Profile_p7_VEEAM_BACKUP_1hour	1527,00 GB	2236,01 GB	3176,40 GB
Profile_s1_VEEAM_BACKUP_exchange	14443,00 GB	23172,47 GB	34900,41 GB
Profile_s2_VEEAM_BACKUP_SQL	16791,25 GB	26848,39 GB	40250,12 GB
Profile_s3_VEEAM_BACKUP_SQL	16431,75 GB	29935,53 GB	46014,18 GB
Profile_s5_VEEAM_BACKUP_LINUX	17296,25 GB	27595,81 GB	41400,59 GB
TOTAL SUM	159627,25 GB	255679,72 GB	385323,12 GB

This is the copy job of all backup jobs.

Copy Backup Job	Total Today	Total with 10% growth in 5 years	Total with 20% growth in 5 years
CopyJob Site A+B to Site C	307,92 TB	431,63 TB	595.29 TB

The backup storage at site C must be a minimum of 600 TB to host copy jobs for the next 5 years, to allow the growth of 20%

The backup policy

---

[5] http://rps.dewin.me/

10.3 Minimum requirements for backup storage

Type	Description	Minimum requirements
Chassis	Sites	3 – Site A, Site B and Site C
	Pr. Site	Information must be provided
	Rack unit	Information must be provided
Performance	Restore TB pr. hour	
	Rate of change	
	Integration	
Hardware	Net ports	SFP28
	Patch cables	DAC cables. (Information must be supplied) 1 RJ45 to OOB/IPMI pr. Controller
Security	Configuration	
	Backup politics	
Power	PSU pr. Unit	2
	Failure tolerance	n-1
	Features	Hot plug
	Watt	Must be explained
	BTU	Must be explained

10.4   Backup proxy server

In the current setup there are two proxy servers, one in site a and one in site b. Both servers have 2x FC connection to the storage network.

Please note that instead of dedicated backup proxy and repository servers, suppliers are free to offer alternative or dedicated backup solutions. For example, appliances such as HPE StoreOnce data protection, Huawei OceanStor, EMC PowerProtect, etc. If appliances are offered, the requirements in section 11.1, 11.4 and 11.4.1 are partly void.

10.4.1 Minimum requirements for backup proxy servers

Type	Description	Minimum requirements
Chassis	Model	Same architecture as VMware hosts
	Pr. site	1
	Rack unit	Information must be provided
CPU	Sockets	Information must be provided
	Cores pr. Host	20
	Core frequency	3.0 GHz
RAM	RAM	64 GB
	Relative performance	> 95%
	DIMM Size	Tenderer must ensure that the RAM capacity can be doubled later. Tenderer must also include an option where ram capacity is maxed out.
	Features	ECC
Power	Pr. Unit	2
	Failure tolerance	n-1
	Watt	Information must be provided
	BTU	Information must be provided
	Features	Hot plug
Networking	Network cards * interfaces	2*2 25Gbps
	Hardware interface	SFP28
	Protocol	Ethernet
	Interface speed	25 Gbps
	Patch cables	4 Cisco DAC cables 1 RJ45 to OOB/IPMI
OS		Windows Server 2019 or RHEL 8 Must be explained
OS SSD	Disks	4
	Capacity	≈250GB OS ≈1TB DATA Available to OS
	Redundancy	Hardware mirror / 2 x Raid 1
IPMI	Interface type	Dedicated RJ45
	ISO Mount via WebUI	Persistent

Storage Networking	Console access via WebUI	Persistent
	Monitoring protocol	SNMP v2c & v3
	Network interfaces	2*FC16 or 2*SFP28
	Hardware interfaces	FC16 or SFP28
	Protocols	Fibre Channel or Ethernet
	Interface speed	16Gbps or 25Gbps
	Patch cables	2 Cisco DAC cables

11. Version history

Version	Person	Date	Description
0.1	Annfinn Thomsen	01/11-2021	Initial draft
0.4	Annfinn Thomsen	02/11-2021	Technical specifications from NEMA (Synack)
0.5	Annfinn Thomsen	09/11-2021	Added comments from DANOFFICE, Conscia and Ingi Mittún, SHV CFO.
0.6	Annfinn Thomsen	10/11-2021	Grammar and spelling corrections. Rewording storage requirements.
0.7	Annfinn Thomsen	15/11-2021	Updated Tender timeframe (section 2.3). Sent for Review at Gjaldstovan.
0.8	Annfinn Thomsen	16/11-2021	Added comments from Formula

12. Attachments

I.   Word acronyms

See separate document; *Attachment I Word acronyms*

II.   General description of HEILSUNET

See separate document; *Attachment II General description of HEILSUNET*

III.   High Level Design of HEILSUNET networking

See separate document; *Attachment III High Level Design NETWORK*