

Water Technology Verification Centre

NOWATECH & DAN-ETV

Business plan





Water Technology Verification Centre

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1 INTRODUCTION

This business plan covers the ETV Environmental Technology Verification Centre for Water Technologies at DHI, in the following called Water Technology Centre. The business plan describes how the verification centre will be operated over the next 3-5 years after completion of the Nordic Water Technology Centres project (NOWATECH) funded by the Nordic Innovation Centre as well as the additional performance contract (DAN-ETV) for the Danish Ministry of Research and Innovation.

The purpose of the business plan is two-fold: To demonstrate the future sustainability of the Water Technology Centre towards the two clients above, and to have an action plan for internal use for the centre's continuation and further development. The latter is intended to be updated with frequent intervals, and this is the first version.

2 SUMMARY OF BUSINESS IDEA

For innovative technologies, the innovative element can itself be a barrier for acceptance in the market. The potential purchaser may be cautious with new, unproven solutions, the authorities can find it hard to approve their use, and the vendor may find it difficult to substantiate their claims on superior performance of their new products.

Environmental Technology Verification, ETV, is a way to overcome this barrier. ETV is independent, comparable and transparent documentation for the performance of innovative environmental technologies. ETV is supplementary to other schemes such as e.g. product certification, but aiming at innovative technologies. ETV schemes have been established in the US, Canada, Japan, Korea and the Philippines, and the European Union is aiming at an EU ETV scheme that can be operative from 2011.

The products from ETV are targeting both technology purchasers and vendors, and are:

- peer-reviewed verification protocols within specific technology areas and applications (customer are purchasers of environmental technology) and
- verification reports and verificates based on above-mentioned protocols and certified quality management system (customer are vendors with environmental technology products).

Customer benefits for purchasers are more agile and efficient purchasing processes from need specification to product specification, vendor search and tender material preparation and vendor selection. Benefits for vendors are competitive advances in terms of independent, third-party verificates to document the functionality of the product in connection with marketing and tender preparation.

As one of the ETV centres (NOWATECH) established supported by Nordic Innovation Centre within water technologies in Denmark (DHI), Norway (Aquateam) and Sweden (IVL) as well as by Danish Ministry of Research and Innovation (DAN-ETV), the objective is to continue operation of the centre as described in this business plan.



3 ENVIRONMENTAL TECHNOLOGY VERIFICATION

3.1 The ETV product

Technologies which are well established in “mature” markets subject to public regulation are often required to be certified under given standards based on accepted performance requirements established over longer time by the responsible authorities and other stakeholders. Such certificates issued by independent certifying bodies are prerequisite for vendors to market their products. The drawback of certifications is the inherent conservatism in introducing new innovative solutions in the market, e.g. due to the time required for changing product standards.

On the other hand, technologies for entire new market needs, or entire new technologies for covering existing market needs in a new manner, are typically subject to pilot and demonstration testing (by the vendors themselves) for proof-of-concept before market entry and/or specific product sales to “early adapting” pilot purchasers. The drawback of pilot testing is the time, efforts and costs for the vendor and purchaser as well as lack of credibility (“proof”) from an independent third party.

Technology Verification lays in between these two extreme market situations, i.e. generally accepted industry requirements can be identified but actual industry standards are not established yet. Instead of a certificate by an independent certifying body or a pilot test by the vendor, a verificate by an independent verification and test body is applied to document the functionality of the product. As predefined product standards are not yet available, peer-reviewed verification protocols must be part of the process. Ideally, verification protocols within application areas are re-used (to ensure comparability between technologies), but updates of verification protocols are inherently required.

ETV is the link between early product development, prototyping and demonstration with emerging technologies and fully regulated certified products with mature technologies.

3.2 The Market and Customer Values

Technology verification is especially useful in new emerging markets with substantial growth in new innovative technologies. Such markets are often quite diffuse with no transparency, i.e. where vendors and purchasers have difficulties finding each other. The energy- and environmental markets with new demands regarding reduced CO₂ emissions, climate change adaptation, and sustainable productions etc. have a specific need for such environmental technology verification solutions to accelerate the market development.

The business market within environment technology is often regulated and with multiple stakeholders involved in the value chains: End-customers, authorities, purchasers, vendors, consultants, industry organisations etc. see Table 1 below.

For authorities, representing public concerns about eg. societal welfare as well as economic and industrial development, there is a balance between maintaining guaranteed standards for the quality of public service (including the flow of products and services to the markets) and on the other hand to encourage innovation and new technology de-



velopment which may eventually enhance the level of societal welfare. Stimulation of growth in green technologies is an example of such joint objectives.

Table 1 Stakeholders in the environmental technology markets

<i>Stakeholder</i>	<i>Example</i>	<i>Role</i>	<i>Their customer</i>	<i>Customer value of ETV</i>
End-customer	Citizens, consumers	Consumption of services and products	-	Better services and products
Authorities	National water authorities	Regulation and control. Assure quality of public welfare.	End-customers	Confidence in safety of new solutions
Purchasers	Public or private water utilities	Provides solutions for e.g. clean water supply.	End-customers, (Authorities)	Efficient purchasing process
Vendors	Membrane manufacturers	Provides technologies for eg. clean water supply.	Purchasers	Faster market entrance and exposure to purchasers
Consultants	Water technology experts	Supports in choice of best available technologies.	Purchasers, (Authorities)	Competition
Industry organisations	Associations like DANVA or Dansk Miljøteknologi	Assist their members to get the best solutions and/or market influence	Members (purchasers, vendors, end-customers)	Increased rate of innovation, more transparency of market

For purchasers, acquisition of new technologies is reflected in the generic so-called “purchase buying process”:

- 1) *Problem identification,*
- 2) *analyses of needs and solution characteristics,*
- 3) *specification of products,*
- 4) *search for vendors,*
- 5) *acquisition of bids,*
- 6) *choice of vendor (and possible pilot testing),*
- 7) *placing the orders,*
- 8) *contract negotiations.*

Each phase is costly and time-consuming. An ETV verification protocol and/or verification reports from each tendering vendor will save time and costs for the purchase in eg. phase 2, 3, 4, 5, 6. Alternatives for the purchasers are to 1) do as usual, eg. buy as last time, 2) use own experts or to 3) use external consultants.

For vendors, promotion and marketing of new innovative technologies are usually the main costs after prototyping a new development. Conservatism in highly regulated environmental markets entails large efforts in convincing purchasers as well as authorities, and to penetrate markets with new unproven technologies. An ETV verification report from independent third-party will eliminate uncertainty about the functionality under agreed requirements generally accepted in the market. Alternatives for the vendors are 1) offer pilot testing and/or demonstration from case to case, 2) extensive marketing efforts towards “early adapter” customers to be used as pilot customers and references or 3) rely on the brand value of the company if already present on the market (possible for larger companies).



Consultants will in principle compensate limited visibility and transparency in the market by assisting authorities and purchaser in selecting solutions. In simplified terms, the consultants most interesting markets are those dominated by pilot testing, and the least interesting markets are those regulated through product standards. For vendors, it can be crucial whether a consultant will include their specific technology in the solution tailoring. For purchasers it is critical whether the consultant knows about new technologies.

3.3 The business model

The cost of producing one verificate (verification statement) is typically between €10,000 and €100,000. This verificate is based on a:

- product-specific test plan, verification report and a test report
- application-specific verification protocol
- industry-specific, independent verification centres and test centres

The initial ETV verifications in the inception phase of the Water Technology Centre have revealed that there are different ways of sharing the costs depending on the technology area and application.

Where there are relatively few (and large) vendors and many (and smaller) purchasers, the vendor will often pay for the entire verifications to get a verificate which will differentiate them from other competitors. Examples are large international companies selling new sensor technologies to e.g. waste water treatment plants.

In markets with many (smaller) vendors and few (larger) technology purchasers, the purchaser may have an interest in buying verification protocols to use in e.g. tender materials. Examples are large international water utilities buying treatment technologies from small innovative technology development companies.

If an entire industry (in this case water technology market) is to adapt a new instrument for market regulation, a catalytic stimulation from authorities and/or industry organizations may be required. Until ETV is a well established and accepted institutional instrument in the market, it appears that external (public) funding is required.

Thus, as multiple stakeholders will have different added value of such verificates, differentiated products from ETV should be offered to different type of stake holders:

- Vendor-financed verification reports and test reports
- Purchaser-financed verification protocols and testplans
- Public funding, of establishing verification centres and test centres

The share between the three is expected to evolve as ETV develops as an accepted model by all stakeholders in the markets. The Water Technology Centre will make use of all three payment models.



4 MARKET SEGMENTATION AND TECHNOLOGY AREAS

Focus will be on the following market sectors (* are new in next phase).

<i>Market Sector</i>	<i>Rationale</i>	<i>Customers</i>	<i>Needs</i>
Water reuse and recirculation	The global market for recreational water (pool water, swimming bath etc.) is rapidly expanding together with economic growth.	Water treatment manufacturers, typically with innovative AOT and/or with novel membrane systems, can be SMV as well as larger	Compliance with national regulatory demands and Bathing Water Directive Demonstration of functionality towards public/private swimming pool owners
		Plant owners, eg. swimming pools	Reduction/substitution of chlorine consumption, which has adverse human health effects.
		Authorities	Encouragement of new technology development which may lead to extended BAT lists....
Drinking water	Water production globally is mainly based on surface water treatment. The global need for water is evident.	Technology manufacturers of treatment as well as monitoring, can be SMV as well as larger.	Market exposure, competitive advantage
		Water works	Access to newest technology, less energy demanding
		Authorities	Drinking water quality
Waste water	Increase urbanization worldwide and substantial growth in waste water treatment markets.	Manufacturers of treatment as well as monitoring, can be SMV as well as larger.	Market exposure not least to international markets (eg. Asian)
		Waste water treatment plants, large industries	Higher energy efficiency and plant capacity
		Authorities	Handling of increasingly complex waste water matrices
Marine environment*	In connection with infrastructure projects like bridges, tunnels, harbours, pipelines, etc. need for online and offline monitoring	Manufacturers of environmental monitoring equipment of eg. chlorophyll, oxygen, suspended solids, velocities	Market exposure, competitive advantage
		Contractors, eg. dredgers responsible for spill monitoring	Effective monitoring which can optimise their production and sustain solution
		Authorities, overall survey and monitoring programmes	Documentation of environmental state
Marine water use*	Shipping industry uses water onboard for ballasting, tank cleaning, cooling, sanitation etc	Technology manufacturers of eg. ballast water treatment	Market exposure, competitive advantage
		Shipping companies	Compliance with regulations, clean water onboard
		Authorities	Implementation of ballast water
Environmental water protection *	Protection of groundwater and surface waters from contamination. Source water protection as well as storm water flow handling	Manufacturers of water monitoring and treatment technologies	Market exposure, competitive advantage
		Water utilities	Efficient technologies
		Authorities	BAT for environmental protection

The technology areas cover water treatment (#1), water monitoring (#2), and environmental monitoring (#3).



5 ORGANIZATION

5.1 Framework and normative references

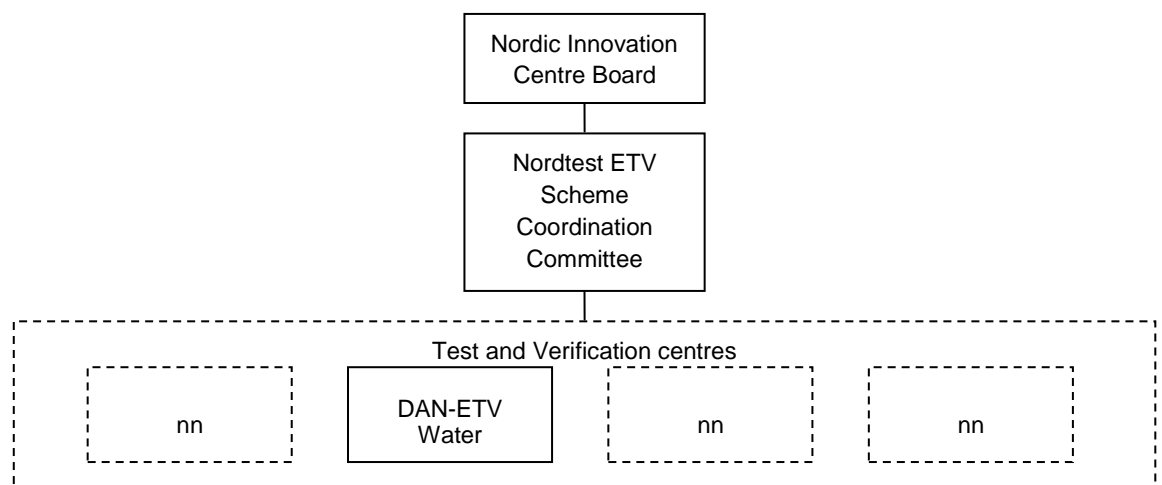
The centre will work under the organization proposed by the partners behind the NOWATECH ETV centres as well as the DAN-ETV centres as a formal Nordtest ETV scheme (NTETV) based upon the expertise developed and the needs identified in the NOWATECH and DAN-ETV project, respectively.

The Nordtest ETV scheme should include:

- A Nordtest method for ETV based upon NOWATECH method
- A Nordtest ETV scheme handbook based upon the NOWATECH ETV quality manual
- A transnational, Nordic coordination committee

The proposed organization is shown in Figure 1 with the Water Technology Centre as one of the centres.

Figure 1 Suggested organization of the Nordtest ETV / DAN-ETV scheme



As the EU ETV scheme is being established, the Water Technology Verification Centre will work for a role as test centre / verification centre.

5.2 Centre organization, resources and staffing

The Water Technology Verification Centre will be organized around a core organization with a responsible for each technology area (water treatment, water monitoring, and environmental monitoring respectively) and a test centre coordinator. In addition, dedicated experts are associated:

- Experts for verification (DHI- or external appointed experts, for peer review of verification protocols and test plans)
- Experts for testing (DHIs own water technology experts, or external experts)



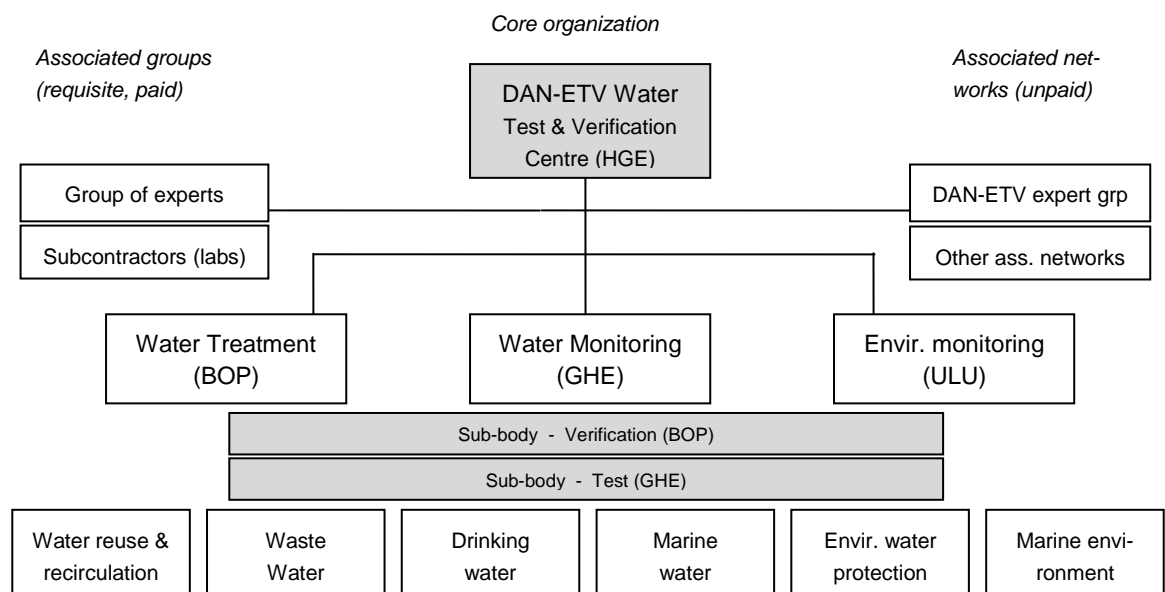
Finally, additional subcontractor support necessary for carrying out verification and testing are associated with the centre:

- Laboratories (DHI will be used. Other laboratories – with due accreditation - will be applied as well, from case to case)
- Test sites (eg. water works, ie. selected places, which can be used more than once, for verifications of products within same application area)

Networks will be associated also to the centre in order to get access to the newest knowledge regarding markets, technologies, regulations and possible influence such stake holders also. The DAN-ETV expert advisory group is supplemented by eg.

- Ambassadors (among project managers providing general consultancy in eg. DHI own departments, purpose is to contribute to marketing of ETV)
- Universities (In particular Danish/Scandinavian universities, to influence curriculum as well as to spot new technology trends)
- Industrial associations (eg. DANVA, to spot new market trends and possibly influence knowledge about ETV)
- Authorities (eg. MST, BLST, to spot new regulatory trends and possibly influence regulatory links as well as funding schemes for ETV)

Figure 2 Organization of the Water Technology Verification Centre



Key resources (staff) with specific expertise in ETV will be the sub centre managers of water treatment, water monitoring, and environmental monitoring as well as the centre manager. A separate organizational framework for Verification and Testing, respectively, is maintained from case to case to ensure that the staff performing test is not the same as the staff doing verification. For each new case (verification project) the responsible for verification and testing, respectively, is appointed. Test experts available in DHI include a number of resources, which can be engaged as ETV expands (ALJ, MTA, CLJ, NHE, MMK, GHK, GIP, etc.)



6 OBJECTIVES

The DAN-ETV Water technology verification centre will until 2012 consolidate the position as one of the leading European ETV centres within water technologies and support the continued development of a transparent and competitive market to the benefit of society (improving the environment through enhanced technology innovation in the environmental sector), water technology vendors (strengthening competitive advantages on national as well as global markets) as well as technology purchasers (better solutions).

Specific objectives are

- At least 6 verifications¹ will be carried out, and 25 verification protocols, test plans and/or quick-scans² will be prepared between 2010 and 2012. Towards the end of 2014, a total of 12 verifications will be carried out and 40 verification protocols, test plans and/or quick scans.
- At least 3 verificates will be prepared jointly with one of the other international ETV centres (in US, EU, Japan, other) before end of 2014.
- The concept of Environmental Technology Verification will be known by main industrial organisations, vendors, purchasers, authorities, institutions of higher education within water technologies, cleantech investors and business incubators

7 PLAN

7.1 Activities

A marketing development plan will be developed for each market sector. The relevant stakeholders in each including vendors, purchasers, authorities, industry organisations and networks will be mapped.

Relevant arenas, where market stakeholders meet and/or communicate, such as internet web pages, technical or market oriented magazines and newsletters, conferences, exhibitions, trade fairs etc. will be identified and used for PR marketing and campaigns.

A list of key pilot customers (leads) will be identified and maintained. Targeted marketing and sales visits to such customers will be carried out, and proposals for verifications will be prepared. Two-ways dialogues will be secured to learn about general customer needs in order to improve the ETV products.

Facilities including test beds, laboratory services, water sampling etc. to support effective product testing will continue to be extended, in-house or outsourced. Development of strategic alliances with external subcontractors will be part of this.

The QMS will be continuously reviewed and subject to improvement as more experiences are gained to ensure state-of-the-art QMS at all times. Liaisons with related ETV

¹ In the inception phase 2007-2009, a total of 4 verifications were done, 1 under Nowatech and 3 under DANETV

² Pre-verification with analyses of requirements for a verification



centres will be used to review own QMS. The Quality Hand Book will furthermore be subject to review and updating.

Fund raising for financing part of the water technology centre and for supporting especially SMEs in the verification of their products will be carried out. Possible sources of fund raising are envisaged to be a.o. from private side: Industrial organizations, larger private organisations and from public side: Ministries, regional funds, EU funds.

Production of pre-verifications (quick scans), proposals, contract developments, verification protocols, test plans, verification reports, verificates will be carried out as the main activity.

International collaboration for joint verifications and/or joint verification protocol development will be pursued through visits and possible exchange of staff. This activity will be intensified after the envisaged start of EU-ETV after 2011.

7.2 *Timetable*

<i>Activity</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>
Marketing development plan	██████████	██████████	██████████	██████████		
PR marketing	██████████	██████████	██████████	██████████		
Targeted marketing and sale	██████████	██████████	██████████	██████████	██████████	██████████
Facility building		██████████	██████████	██████████	██████████	
QMS capacity building	██████████	██████████	██████████	██████████		
Fund raising		██████████	██████████	██████████	██████████	██████████
Pre-verifications, quickscan	██████████	██████████	██████████	██████████	██████████	██████████
Verifications	██████████	██████████	██████████	██████████	██████████	██████████
International Development			██████████	██████████	██████████	██████████



7.3 Financial model

The budget is depicted in Table 2. A gradual increase in revenue is assumed from 2010 to 2014. The development costs (Marketing, PR, sale, facility, QMS, fundraising, International development) are assumed to balance the revenue (pre-verifications and verifications) so that a non-profit business is established.

Table 2 Tentative budget 2010-2014 (in thousand Danish kroner tDKK)

BUDGET Currency (tDKK)	2010	2011	2012	2013	2014	Total
Verifications (#)	2	2	2	3	3	10
Dev. Costs (Marketing etc)	-1000	-1000	-1000	-1000	-1500	-5500
Revenue (Pre-verifications, verifications*)	1350	1500	2000	2500	2500	9850
Dev. Costs (International)		-500	-1000	-1000	-1000	-3500
Margen	0	0	0	0	0	0

*) It is assumed that the cost of one verification is approximately 500 tDKK plus external laboratory expenses approx. 100 tDKK.

Activities are financed partly through ETV product and service sale, partly through public and private funding for ETV capacity building. An application for The Danish Ministry of Science and Innovation (MVTU) is under preparation. Additional public (regional, EU, Nordic etc) funding will be applied for. The percentage of private funding is expected to increase from 2010-2012 (Table 3) to 2013-2014 (Table 4)

Table 3 Financing of ETV activities 2010-2012 (in thousand Danish kroner tDKK)

Activity	Vendors/ purchases	MVTU	EU, Nordic, Regions	Total
Marketing, PR, sale, facility, QMS, fundraising		2000	1000	3000
Pre-verifications	250	1250		1500
Verifications*	500	2850		3350
International development	250	250	1000	1500
Total	1000	6350	2000	9350

Table 4 Financing of ETV activities 2013-2014 (in thousand Danish kroner tDKK)

Activity	Vendors/ purchases	MVTU	EU, Nordic, Regions	Total
Marketing, PR, sale, facility, QMS, fundraising	1000	500	1000	2500
Pre-verifications	500	500	1000	2000
Verifications*	1500	500	1000	3000
International development	500	500	1000	2000
Total	3500	2000	4000	9500



7.4 Milestones

Critical milestones are listed below. If milestones are not accomplished, the business plan and the overall objective of ETV water technology centre reviewed.

- Start of 2010: Funding from Ministry of Science and Innovation of 2100 tDKK/year
- End of 2011: EU-ETV agreed and funded with envisaged operational start in 2012
- In 2010, 2011 and 2012, number of accomplished verifications as listed (one, two and two)