



ADU-RES Project

Co-ordination Action for Autonomous Desalination Units based on Renewable Energy Systems

Exploitation Plan



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Text Box 1 ADU RES Project description

The ADU-RES project aims to bridge the gap between the technology development and the commercial implementation of autonomous desalination units powered by renewable energies in the Mediterranean region. It is funded by the EU 6th Framework Programme 'Research and Technology Framework'. Partners in the ADU-RES project include:

AUA, Agricultural University of Athens, Greece		FM21, Fondation Marrakech 21, Morocco	
CDER, Centre de Développement des Energies Renouvelables, Algeria		IAV, Institut Agronomique et Vétérinaire Hassan II, Morocco	
CRES, Centre for Renewable Energy Sources, Greece		INRGREF, Institut National de Recherche en Génie Rural, Eaux et Forêts, Tunisia	
CREST, Centre for Renewable Energy Systems Technology, Loughborough University, UK		ISE, Fraunhofer Institute for Solar Energy Systems, Germany	
E.C. DG-JRC, Institute for Environment and Sustainability, Renewable Energies Unit, EU		ITC, Instituto Tecnológico de Canarias, Spain	
ELARD, Earth Link and Advanced Resources Development, Lebanon		PHG, Palestinian Hydrology Group, Palestinian Authority	
ETA-Renewable Energies, Italy		RSS, Royal Scientific Society, Environment Monitoring & Research Central Unit, Jordan	
EWE, Egyptian Association for Water and Energy, Egypt		WIP-Renewable Energies, Germany	

For more information please see www.adu-res.org



Executive Summary

In the context of current concerns about growing water scarcity, seawater desalination based on renewable energies (RE) has much to offer. The potential of this technology is particularly high in the water scarce regions of the Mediterranean. Maximum benefit can be achieved in remote coastal and inland locations, often without access to electrical and water supply networks, through implementing small-scale autonomous desalination systems (ADS)¹. ADS are now technically feasible but need further impetus to begin commercial scale implementation.

Widespread implementation of ADS in the Mediterranean can best be achieved by creating ideal conditions for a market breakthrough. This needs multi-sector measures, prepared effectively and well-organised, and implemented according to a clear plan. The exploitation plan outlines a strategy to achieve this based on the experience and the knowledge collected within the ADU-RES project.

This knowledge used to be shattered between institutes and companies in EU and the developed strategy consists of four main steps:

1. Improve ADS performance through coordinated and targeted research;
2. Create a knowledge basis through support for education and training;
3. Improve policy and Institutional conditions to facilitate ADS market development;
4. Create ADS testing and production facilities.

For the effective implementation of the strategy it is recommended to develop an influential lobby group with representatives from the industry and academic world.

In the frame of the ADU-RES project, the knowledge on the field has been collected and evaluated and specific recommendations for the next steps of the sector have been formulated. This invaluable information pool is now available and provides the scientific argumentation and knowledge base for the ADS commercialization strategy.

This report outlines a strategy for the successful widespread implementation of ADS in the Mediterranean. It is now in the hands of the ADS community to get together, combine research efforts and experiences of the past 20 years and follow this strategy.

1. Introduction

This report suggests a way forward for a successful implementation of small scale autonomous desalination systems powered by renewable energies (ADS) in the Mediterranean region. It is the fulfilment of Deliverable 8.8 of Work Package 8 (Information dissemination and exploitation), which is to develop a 'specific exploitation plan'. Basically, it is a compilation of all ADU-RES results and dialogue between key stakeholders of the industry and research community present at various ADU-RES events. For more information about ADU-RES, please see Text Box 1.

1.1 Objectives

With this report the ADU-RES project aims at boosting the implementation of ADS technology by developing a concrete 'Exploitation Plan'. It is a strategy for the maximum exploitation of the ADU-RES project results on the basis of follow-up measures and policies enabling ADS market breakthrough. In simple words the overall objective of the Exploitation Plan is to guarantee sustainability of the co-ordination action ADU-RES.

Therefore the Exploitation Plan has the following key objectives:

1. List the most important recommendations related to the optimisation of:
 - ◆ technological performance;
 - ◆ socio-economic, environmental and financial aspects;
 - ◆ policy, institutional and legislative conditions knowledge base, education and research at all levels.
2. Outline the key measures and policies needed to facilitate market development for ADS;
3. Inspire key stakeholders of the ADS community to form a lobby group and establish a platform in order to exchange and communicate knowledge and apply pressure in order to:
 - ◆ convince decision makers and public authorities to implement the measures and policies needed;
 - ◆ raise general awareness of the technical options and socio-economic benefits and barriers of RES based desalination.

The Exploitation Plan mainly addresses relevant stakeholders in the RE-desalination community who have the capacity and intention to improve framework conditions in favour of enhanced implementation of ADS. Researchers active in this field and members of the renewable energy and desalination industry are targeted. Also project developers can benefit from the recommendations contributing to drastic cost reduction, improved reliability

¹ Small-scale autonomous desalination systems powered by renewable energies are hereinafter called 'ADS'. The main focus thereby lies on systems with the desalination capacity of < 50 m³/day, but ADS also includes some autonomous RE-desalination systems producing up to a few 1.000 m³/day.



and successful integration into the society and the environment. The Exploitation Plan will be widely disseminated with the aim to reach as many individuals, organizations and utilities as possible.

1.2 Structure of the report

This report outlines a strategy for the widespread implementation of ADS in the Mediterranean, based on project findings obtained over two and a half years of the ADU-RES co-ordination action and dialogues between key stakeholders.

In chapter two, first background information is given and the rationale for the Exploitation Plan is presented. Then a compilation of recommendations for the successful, widespread implementation of ADS in the Mediterranean is provided. The recommendations come from the work performed within the ADU-RES project and the interaction between researchers, industry and policy makers during the ADU-RES results. The various recommendations have been grouped into specific steps that form an overall strategy for the creation of an ADS market. The sum of all recommendations and measures are aimed at the ADS community in general, national and EU governments, project developers, public authorities and the general public. The third chapter presents the need for a lobby group that will coordinate the implementation of the exploitation plan. The last chapter summarises the main conclusions and motivates the ADS community to follow them up and implement them in an effective and forward-looking way.

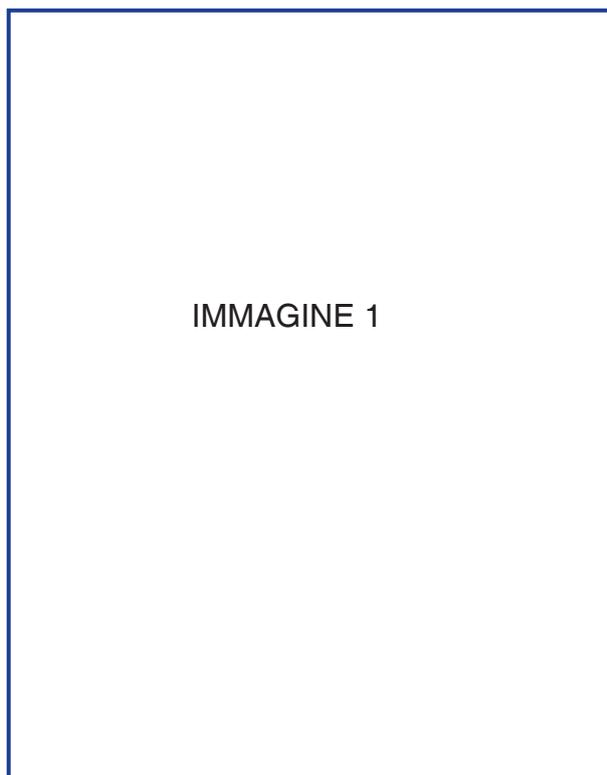


IMMAGINE 1

2. Strategy for an ADS market development

During the last two and a half years, a large number of studies have been executed within the scope of the ADU-RES coordination action². The project aims at developing the idea of autonomous desalination further by boosting the implementation of these systems in the Mediterranean. A wide range of international experts, researchers and the industry have provided their expertise and brought together knowledge and experiences in the field of renewable energy based desalination. One of the main conclusions of the project is that the coupling of renewable energy and desalination technology provides technically mature applications ready for wide-scale commercialization. However, there is still room for R&D improvement related to reliability and reduction of energy consumption. In addition there are still financial barriers and risks to overcome.

In the process of setting the ideal framework conditions for the widespread market penetration, the ADU-RES recommendations need to be implemented. The speed of implementation and effectiveness would be aided by the formation of an industry representative or lobby group in order to communicate the recommendations to decision makers and public authorities who have the power to implement them. The lobby group will perform this role and apply pressure for the necessary reforms on a regional and international scale.

Recently the RE-desalination technology has already become competitive for stand-alone, remote locations where existing energy and water infrastructure is lacking. Real applications will allow members of the ADS community to climb the learning curve and achieve economies of scale, permitting them to address progressively larger markets.

2.1 The strategy

The Exploitation Plan is the result of compiling and adapting the wishes of commercial stakeholders present at ADU-RES events. It is a specific plan aiming at the implementation of the central ADU-RES objectives to:

- ◆ Create a market for small scale autonomous desalination systems based on renewable energies
- ◆ Overcome financial, technological and performance risks
- ◆ Support commercial applications
- ◆ Enable technology implementation without the need for subsidies

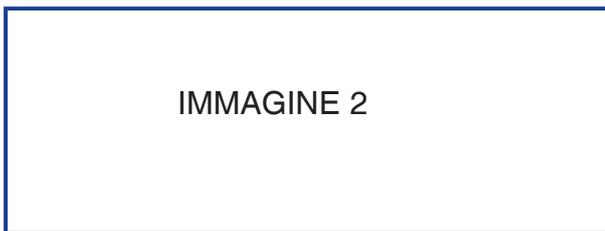
² ADU-RES started on the 1st of April 2004 and was completed by October 2006.



The strategy for new market creation is a process involving a network of stakeholders of the product community. Therefore, the first approach for the creation and development of the ADS market will be to mobilize key stakeholders of the RE-desalination community and to establish a lobby group. The main objective of the group will be to facilitate the market penetration of ADS through creating ideal framework conditions for a new market. Having the lobby group established, there are four main steps to be undertaken towards the commercialization of ADS technology:

1. Improve ADS performance
2. Support education and capacity building
3. Improve policy and institutional conditions
4. Create ADS testing and production facilities

In the following sections, these steps will be presented and a list of recommendations as derived from the ADU-RES research will be given in each paragraph. Finally, it will be explained, how the lobby group should be formed and what role they play in the strategy of the Exploitation Plan. The figure below shows the most important steps towards the creation of an ADS market (figure 1).



2.2 Step 1: Improve ADS Performance

Much progress has been done over the past years on the performance of ADS. Intensive research and development efforts have given good results and the systems nowadays are more robust and reliable. There are various technology combinations in different stages of development, from mature systems to concepts that have not yet been tried in a pilot installation.

There is always room for improvement, with ADS becoming more cost effective and more reliable. Within the ADU-RES project much work has been done on the issue and concrete recommendations for the topics of future research focus have been suggested. As the market is developing, it is expected that research and developments activities will be moving from public institutes to respective departments of private companies. This has already been observed, both for membrane and for thermal desalination technologies powered by renewable energies, which is a clear signal that the fast market development is close.

As there are still only a few ADS offered in the market as ready products, project developers tend to combine the desalination units with the renewable energy equipment themselves. This is a technically challenging task and the success depends on various parameters, many of them site specific. The development of the market depends heavily on such efforts, which raise awareness about the possibilities and applicability of the solution paving the

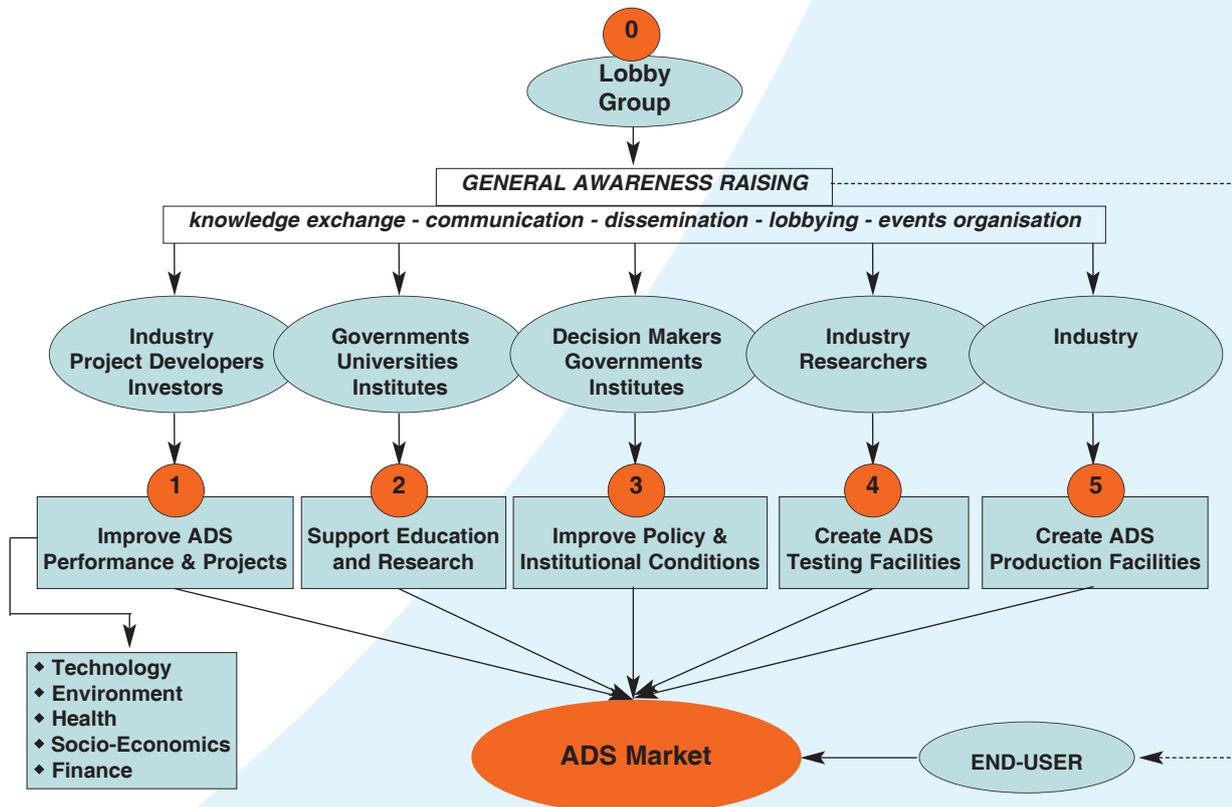


Figure 1: Five steps towards the large-scale commercialization of ADS.



way for more installations and eventually attracting the interest of large companies that will invest in further developing and standardising the technology. For accelerating this procedure, exchange of experience between the project developers is crucial for achieving units:

- ◆ technically advanced with long life, low maintenance requirements and low operating costs;
- ◆ well integrated into the social structures, accepted by the local populations and with effective operation and maintenance concepts;
- ◆ well integrated to the natural environment with operation that ensures minimum impact;
- ◆ financially sound performance that allows to cover the operating and capital costs over the life time of the unit according to a consistent scheme.

The work of the ADU-RES project has concentrated in collecting experiences from project developers, evaluating their contributions and compiling a list of tips for assisting new developers in the fields mentioned above.

Below the suggestions for future research and the tips for project developers are summarised and presented in a tabular format. It is recommended that interested parties refer to the original reports [1], [2], [4], [5], [7] and [8] for more detailed information (figure 1 - figure 6).

2.3 Step 2: Support Research, Education and Training

It has been suggested that local people and entities undertake increased responsibility of ADS in their area. For an effective implementation of that, the respective people have to be trained on issues related water supply planning, operation and revenue collection. Training courses should be periodic to keep the personnel up-to-date with the latest technological developments and the national policies and procedures. In addition, technicians with adequate skills are needed to operate the ADS.

The training of for this role should be the direct responsibility of the company producing the technology, which will train people tailored to the requirements of the specific technology installed. For advanced maintenance requirements, engineering companies in the region could be responsible after reaching agreements with the installing company involving know-how transfer.

Higher education programmes covering technical, engineering and theoretical aspects of ADS could have far reaching positive impacts. A body of experts would be developed that will eventually get positions within research institutes, governmental agencies, local authorities and the industry.

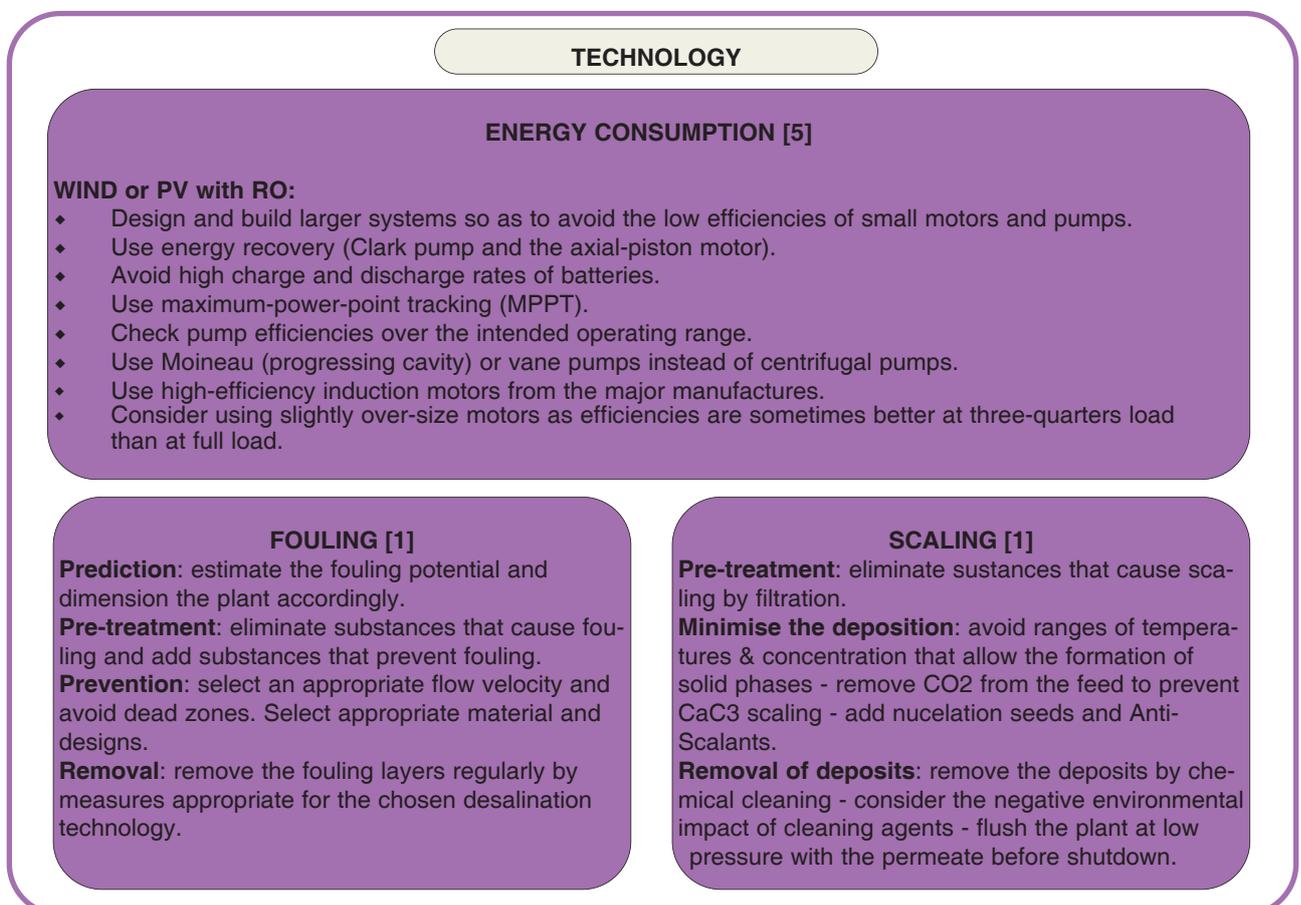


Figure 2: Recommendations for the improvement of technical ADS performance.



HEALTH AND SAFETY

SAFETY [1, 8]

- ◆ Prepare a risk assessment study considering adverse events such as chemical spillage or natural disaster

DISINFECTION [1, 8]

- ◆ Use alternative disinfection methods instead of simple chlorination such as:
- ◆ **Chemical disinfection** using Chlorine Dioxide, Chloramine or Ozone (O₃)
- ◆ **Physical disinfection** based on Ultraviolet Radiation, Solar Water Disinfection or Anodic Oxidation
- ◆ **Special Treatment:** treatment with activated carbon filters to remove VOCs

PRE-& POST-TREATMENT [1, 8]

- ◆ Use innovative pre-treatment techniques for minimizing the need for hazardous chemicals
- ◆ For remineralisations mix product water with feed water in small isolated plants if feed water is free from toxic substances

REMOVE BORON [1, 8]

- ◆ Special membrane element with higher boron-rejecting performance
- ◆ Absorption on active carbon and ion exchange methods
- ◆ Boron removal through reacting seawater with fly ash and coal materials

Figure 3: Recommendations for the improvement of ADS health and safety performance.

ENVIRONMENT

GENERAL [1]

- ◆ compile a full description of the surrounding environment to serve as a baseline for assessing environmental effects

BRINE DISCHARGE [1]

- ◆ use post-treatment techniques for the removal of hazardous constituents from the brine prior to discharge
- ◆ discharge brine properly to reduce environmental impacts. Discharge options include:
 - a pipe into the sea for discharge of brine from coastal plants
 - mixing of the brine with the cooling water of a power plants
 - inland evaporation pond for larger plants
 - injection of the brine in a deep well in cases where a white shallow suitable geological formation exists
 - mixing the brine with the sewage of a municipal system
 - irrigation of salt tolerant plants
 - transportation of the brine to a site where it can be disposed of appropriately if there is no other solution

Figure 4: Recommendations for the improvement of ADS environmental performance.



SOCIO-ECONOMICS

SOCIAL AND GENDER IMPLICATIONS [8, 2]

- ◆ practise appropriate and effective communication between active participants
- ◆ involve both men and women in decision-making processes, planning implementation and maintenance processes
- ◆ encourage the development of new skills and expertise within an integrated water resource management (IWRM) framework
- ◆ use women's and indigenous people's traditional knowledge
- ◆ build capacities before, during and after project implementation
- ◆ ensure available funding for follow-up training after completion of infrastructure

CONSUMER DEMAND [1]

- ◆ focus on the development of products tailored to the needs of specific customers
- ◆ give special attention to simplify operation procedures and develop remote monitoring systems
- ◆ lower the costs and increase the acceptability of local populations by using local materials and labour

GENERAL SOCIO-ECONOMIC ASPECTS [1, 2]

- ◆ ensure that ADS contribute to rural development and poverty alleviation
- ◆ combine ADS with water demand management programmes
- ◆ empower users by participation, qualification and information
- ◆ build on existing structures and co-operate with local organisations from the early stages of development
- ◆ consider the traditional forms of behaviour and organisation in the user population and the legal and national framework conditions
- ◆ ensure that the responsibilities, distribution, financing, operation and maintenance are clearly defined and openly communicated to all stakeholders
- ◆ make sure that there are secure sources of income to pay for operation, maintenance and spare parts in the long run
- ◆ monitor and evaluate the ADS long enough to make sure it operates smoothly integrated in the environment

Figure 5: Recommendations for the improvement of ADS socio-economical performance.

COSTS AND FINANCE

COST REDUCTION OF INTEGRATED ADS DESIGNS [4]

- ◆ optimize the feed water system and limit the chemicals used for the pre-treatment
- ◆ improve energy efficiency for example with improved high pressure pumps and membranes or energy recovery systems
- ◆ optimize the energy supply system (hybrid power supply systems, design of the energy supply system in accordance with the local conditions)
- ◆ avoid large battery systems

FINANCING MECHANISMS [7]

- ◆ use the most appropriate financing schemes for covering capital and operating costs - options include: micro-financing, loan securing from banks, or other sources by local communities in the form of instalments on their water
- ◆ encourage donors and funding agencies to establish small loan funds at the local or community level available for the public, local entrepreneurs and businesses
- ◆ support public-private partnerships to secure funding and know-how for reliable ADS applications

Figure 6: Recommendations for the improvement of ADS cost and finance performance.



Thus, the idea of ADS will be widely accepted and initiatives for new projects will be undertaken from different stakeholders. Moreover, the need for training sessions described above will be gradually reduced as qualified graduates will be available. Post graduate programmes could have an interdisciplinary orientation covering various aspects from theoretical background to practical training and institutional issues.

Existing water and energy research institutes should be encouraged to develop departments for desalination based on renewable energy. There, water and energy specialists in close cooperation would undertake basic research and develop pilot units. Next to the existing institutes, new centres should be established which could undertake coordinating roles on national and international levels.

Finally, a forum should be developed where policy-makers and experts can interact and exchange ideas on plans and programmes. Such a forum can be a very useful tool bringing together the two groups which usually operate independently. However, its practical implementation can rely only to initiatives and event organisation of influential national and international institutes.

Some concrete recommendations on research, education and training needs are given in next table (figure 7).

2.4 Step 3: Improve Policy and Institutional Conditions

There are institutional or legislative aspects counterproductive to the expansion of ADS. Similarly, there are ways that new legislation or institution reform could create favourable conditions to the development of the ADS market.

In most of the countries the legislation and licensing procedures do not take into account desalination. This is even more so for autonomous desalination based on renewable energy. The result is that there are various points where misunderstandings and unclear situations may arise when trying to develop a fully legal autonomous desalination unit.

Decentralisation can play a crucial role on the demand side as it reveals people's preferences among different water supply alternatives and on the supply side as it provides incentives for more efficient provision of water supply services. Decentralization can also improve the supply standards and protection of the environment with closer monitoring of relevant regulations. The central government on the other hand should ensure that activities in the water sector are coordinated. General directions and the overall rules should be given through policies and laws that define the responsibilities and rights of every actor in the sector.

Some concrete recommendations on the improvement of policy and institutional conditions for ADS are given in the table on next page (figure 8).

RESEARCH, EDUCATION, TRAINING

COST REDUCTION OF INTEGRATED ADS DESIGNS [4]

- ◆ strengthen research capacities for technical development of ADS, adaptation to local conditions and integration in the social environment.
- ◆ suitable bodies should undertake the research coordination and establish contacts to policy makers.
- ◆ higher education programmes covering technical, engineering and theoretical aspects of ADS are needed.
- ◆ the international ADS community should work together to develop basic educational material.
- ◆ build capacities, before, while and after the project. Implementation.
- ◆ ensure available funding for follow-up training after completion of infrastructure.
- ◆ the personnel from local authorities or associations that undertake water supply responsibilities should receive periodically adequate training in technical and administrative issues.
- ◆ training and know-how transfer to technicians is required for the O&M of ADS. This should be included as responsibility of an installing company in the relevant contract.
- ◆ arid countries should establish such programmes, aiming to develop and implement technologies tailored to the needs of their lands and then export their expertise to neighbouring countries.

Figure 7: Recommendations on ADS research, education and training needs.



POLICY & INSTITUTIONAL CONDITIONS

PRICING, FINANCING & SUBSIDIES [2]

- ◆ promote cost recovery schemes in pricing of rural water supply that will allow ADS to compete in equal terms with other water supply solutions
- ◆ support the financially weak end users in covering the extra costs of water supplied under the cost recovery principle
- ◆ subsidise ADS for the clean and autonomous supply water
- ◆ finance this activity from taxation of conventional fuels and charges for the exploitation of natural water resources

DECENTRALISATION [2]

- ◆ transfer responsibility for managing and exploiting water resources supply to the local level (local authorities, NGOs, user associations, etc.)
- ◆ facilitate and coordinate the decentralisation by ensuring clear allocation of responsibilities and rules of the game

LEGISLATION [2, 3]

- ◆ **EU:** clarify the definition of small-scale drinking water supply under the EU Water Framework Directive.
- ◆ **EU:** reduce complexity of monitoring water quality parameters for water produced from small scale desalination units.
- ◆ **EU:** update EU Drinking Water Directive to take account of any change in WHO guidelines.
- ◆ **National:** adapt national legislation to take account of ADS [2].
- ◆ **National:** include ADS in general national plans [2].

Figure 8: Recommendations on improvement of policy and institutional conditions for ADS.

2.5 Step 4: Create ADS Testing and Production Facilities

Testing Facilities

In the ADS community there is a wide range of developed RE-Desalination coupling options that have been developed and tried under various conditions and from different entities. As the market has started developing and the technologies come from the laboratories to be offered to the end-users, it is necessary to develop methods and processes that will allow the end-user to be sure about the performance of the unit in different conditions and the expected technical life.

Up to now, the published results were some times over-ambitious and therefore many entities tend to have doubts when it comes to the performance figures of ADS. There is the need to give manufacturers and developers the opportunity for quality verification of their products and therefore the ADS community should be actively engaged in the field of standards & certification. One central step in such a process would be the development of testing facilities where ADS could be tried. The main objectives of creating ADS testing facilities include:

- ◆ provide standardized characterisation and testing of RE-desalination components and complete systems to ensure quality standards;
- ◆ allow for better comparison between alternatives;
- ◆ identify the most promising ADS concepts and the ones closer to a market breakthrough;
- ◆ create and further enhance the positive image of the technology.

For the successful creation of testing facilities, first various sites have to be considered and evaluated. It is expected that institutes with existing laboratory structures and experience in ADS will be interested to be the first who will develop testing facilities. Of course, they should be close to the sea and have plenty of sun and wind for real testing conditions.

The international research community should then agree on standardized performance parameters and testing methods. The testing should try to differentiate between the energy and desalination equipment as well as test them as a combination under various conditions. Also, a common methodology for calculating the costs should be developed.



Production Facilities

At the moment, ADS are produced from research institutes or small to medium companies. There is a capability to produce just a few units on demand and most of the actors would not be ready to respond to a large supply request. This has been evident on emergency relief cases, where ADS were requested for water supply after natural disasters.

Naturally, the investment of production facilities would follow the first signs of increasing demand. However, as the ADS market is expected to grow, the involved actors should start preparing and planning for commercial production. Parallel to the creation of production facilities, a network of maintenance points needs to be developed to guarantee sustainability of the installed ADS.

Before a technology can be brought to the market important steps related to the development of the technology have to be completed; namely to finalise the design, patent it, identify target markets and end-users, develop a business plan and investigate funding opportunities. After these are completed the planning of production facilities should start, including:

- ♦ standardise the technology and its production process;
- ♦ define the location where the commercial pieces of the system will be manufactured;
- ♦ identify the suppliers of the spare parts;
- ♦ minimise costs by setting-up a production line and a distribution network;
- ♦ develop supporting materials, like an 'operators manual';
- ♦ develop supporting structures and networks like a spare parts distribution network.

IMMAGINE 3

3. Establish a Lobby Group

This report has outlined a strategy consisting of 5 concrete steps to facilitate the widespread commercialization of ADS systems. Actions are needed to set in motion the driving forces to take these steps. Besides lobbying work, general awareness rising, exchange, transfer and dissemination of knowledge are needed.

A lobby group has to be established to promote ADS in the MENA region and internationally. The lobby group will have the following main objectives:

- ♦ facilitate exchange of knowledge on a professional networking platform;
- ♦ undertake lobbying work to promote removal of administrative and legislative barriers to ADS implementation;
- ♦ communicate the recommendations formulated in the ADU-RES reports to decision makers, public authorities, manufacturing companies as well as to ADS project developers;
- ♦ raise general awareness of the technical options, benefits and barriers of RE-desalination through dissemination of knowledge and media work;
- ♦ circulate relevant information to its members and organise meetings and events;
- ♦ undertake overall coordination of research, standards development and market penetration strategies.

The establishment of a lobby group will not start from zero. There are well-established large organizations and networks active in the field of conventional desalination. Today, most of them have RE-powered desalination as part of their activities, although it constitutes only a very small part. Nevertheless, working together with the existing organizations and networks in order to build new structures will help facilitating the realization of the potential of RE-desalination.

From the energy side there are also many RE related networks and associations that would be interested and relevant in the creation of an ADS lobby group. The recently founded European Solar Thermal Technology Platform (ESTTP³) has already created a working group on solar-desalination.

Most importantly, the industry has to be among the founding members of the network together with the academic community.

³ ESTTP was launched on 21 June 2005 at the 2nd European Solar Thermal Energy Conference estec2005. Technology Platforms (TPs) are instruments created by the European Commission in order to bring together stakeholders of a technology to strengthen Europe's leading position in certain technology areas. It is expected that the TPs will influence the European R&D politics decisively.



To sum up, the lobby group will build on:

♦ **Existing networks and organisations:**

- European Desalination Society
- Middle East Desalination Research Centre
- Moroccan Membrane and Desalination Society
- ADU-RES
- Committee of the NATO ARW 'Solar Desalination for the 21st century'⁴
- European Renewable Energy Council including also EPIA, ESTIF and EWEA

♦ **Industry:**

- The conventional desalination industry
- The renewable energy industry including small to large scale manufacturing enterprises
- The ADS industry

♦ **Researchers active in the field of RE-desalination:**

The lobby group will be directed from a steering committee which will include members of the organisations and networks mentioned above, the industry and researchers. The first steps towards the creation of the lobby group would include:

- compile a list of potential members based on the ADU-RES database;
- spread the idea of the lobby group among potential members through Newsletter, Internet Portals, presentations at conferences and seminars;
- organise a first meeting where a steering committee will be formed;
- prepare a plan for taking the initial actions;
- raise funds for financing a secretariat to coordinate the lobby activities.

Reference List

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⁴ The NATO Advanced Research Workshop (ARW) 'Solar Desalination for the 21st century' was held in Hammamet, Tunisia, 23-23 February 2006; a clear outcome of the NATO ARW was the decision to establish a network of all actors active in the RE-desalination field [9].

4. Conclusions

Desalination coupled with renewable energy sources is a proven combination, though there is still much room for improvement. Overall terms market penetration still remains low with most of the systems constructed to date being research or demonstration projects. In the frame of the ADU-RES project, much effort was put into compiling knowledge on relevant R&D actions and developing recommendations for future actions. This invaluable information pool is now available and provides the scientific argumentation and knowledge base for the ADS commercialization strategy.

The Exploitation Plan outlines the strategy for achieving a fast and sustainable development of a market for ADS. The plan includes four major steps, namely:

1. improve ADS performance through coordinated and targeted research
2. create a knowledge basis through support for education and training
3. improve policy and Institutional conditions to facilitate ADS market development
4. create ADS testing and production facilities

An effective follow-up of this strategy requires the establishment of a strong and influential lobby group that will plan in detail and implement the various steps. Such a lobby group should include representatives from the desalination and renewable energy industries and research communities. This is the main outcome of the ADU-RES work and the consortium of the project will actively contact and motivate all relevant stakeholders to join forces in view of a common good.