

# Four steps to managing risks in desalination projects

As global water shortages worsen, desalination projects are likely to proliferate. Sponsors that can manage project risk will capture significant value while helping the world meet its water needs

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**I**ncreasing pressure to find alternative sources of water is intensifying the global focus on water-related projects, including those based on desalination technology. Desalination enables public and private entities to produce water that is needed for purposes ranging from personal consumption to agricultural and industrial uses, such as mining.

While desalination is a critical technology for addressing a worsening global fresh water shortage, desalination projects raise a host of legal issues for sponsors and lenders to consider before embarking on a project investment, or when hammering out the contracts. To address these issues, participants in desalination projects should ensure that the following four steps are taken.

## Establish clear offtake rules and processes

A desalination plant may have offtakers (water purchasers) that are governmental and/or private entities. For example, a local government entity might be an offtaker to feed a public water supply, or a mining or industrial process company might be an offtaker for the water needs of its operations.

In both cases, sponsors and lenders will need to consider several important issues, including:

- How the plant will be connected to the public delivery system and/or the private entity's intake system
- Who will be responsible for constructing, operating and maintaining any required and associated connection facilities and/or pipelines
- Whether there is a long-stop date or similar milestone after which the offtake agreement may fall away, and who will bear the risk of any losses that arise as a result of a delay to the commencement

of operation of the plant and/or related facilities or their unavailability during operations

Reaching agreement on these issues is critical but can be difficult and time-consuming, and may need to follow strict procedural, permitting and other similar requirements.

The manner in which the price under the offtake/water purchase agreement is set and/or fluctuates will also be critical. In some jurisdictions, water rates are set by governmental agencies or subdivisions thereof, such as public utility commissions. As a result, the parties may have little if any price flexibility. In addition, the agreement between the plant and the government entity will have to address the issue of which party will absorb any future rate reduction after the offtake/water purchase agreement has been signed.

Contracts must also address whether, and if so how, the price will be adjusted to take into account variations in the price of electricity, given that power costs are likely to constitute a very significant portion of any desalination plant's operating costs. The project may not be viable to sponsors or bankable to lenders if the water price will not be (or remain) sufficient to cover operating expenses and debt service as well as a desirable return on the sponsors' investment.

## Secure a reliable supply of electricity

Desalination is an energy-intensive process—the cost of power can account for as much as 55 percent of a desalination plant's operating costs. Securing a reliable and sufficient source of power is critical to any desalination project's success. Many such projects are part of or attached to larger power projects in the Middle East, for example.

The choice of power supply will depend to a significant extent on where the plant is located. In an urban setting and subject to overall demand, the plant may be connected to and take all or some of its power from the electricity grid. For a plant in a remote location, a standalone (and possibly therefore renewable) energy source, such as wind, wave or solar power, may be the best option to provide power in whole or in part. Consideration should be given to whether such a power source can or should be part of the desalination project.

In either case, sponsors and lenders must watch for the project-on-project issues that can arise when the building of a new desalination plant must incorporate a second project to build a power source. The plant will not be able to begin operating and earning revenues if the related power project is not completed on time, and it may suffer losses if the power project does not operate at expected capacity.

Sponsors and lenders must also perform due diligence on the power project's construction and operating arrangements to ensure that, at a minimum, the following key requirements are addressed adequately:

- The contractor and operator of the power project have the required experience and expertise
- The power project meets the necessary technical specifications
- The power project will be completed on time
- The power project will not reach the end of its operating life before that of the desalination plant

If the power project will provide power to multiple users (rather than being dedicated to the desalination plant), priority of power offtake will need to be negotiated among

the owner of the power project, the sponsors and the other third-party users.

### Manage environmental issues

Desalination plants can give rise to a number of potentially significant environmental issues. Marine life may be harmed during the process of drawing seawater into the plant and/or by the increased salinity of the plant's brine output. Chemicals used in pretreatment of the seawater may be discharged from the plant along with the brine output, and desalination plants powered by fossil fuels may also raise concerns about local carbon emissions, particularly in carbon-sensitive regions.

The sponsors should consider potential mitigants, such as whether it would be technically feasible for subsurface intake in order to avoid harm to marine life and/or whether the project's brine output can be diluted prior to discharge or released in multiple locations to minimize its impact.

In the early stages of the development of any desalination project, a thorough environmental assessment must be undertaken, and environmental permits and approvals secured, typically at several governmental levels. In the US, for example, the city, county, state and federal governments will all have a stake in approving and regulating the project.

Sponsors will need to take the environmental assessment and regulatory compliance phase into account in the project's timetable, and lenders will want to ensure that such requirements have been met to date and that the loan documentation for the project contains appropriate covenants requiring compliance with environmental laws, including requirements to remediate environmental harm and related indemnities.

### Pick the right model for sourcing desalination tech

To remove salt from seawater, desalination plants currently use one of two technologies: thermal or membrane. In certain parts of the world, such as the Middle East, a thermal technology called multi-stage flash has been most widely used. Most desalination plants in the rest of the world employ a membrane technology called reverse osmosis.

In reverse-osmosis plants, one of the most significant operating and

maintenance costs is membrane replacement. A reverse-osmosis plant's efficiency, as well as the amount of energy it consumes, can be negatively affected by poor membrane quality and condition.

Sponsors of a reverse-osmosis plant should assess whether contracting directly with the membrane supplier or having the plant's operator do so would be preferred, as each alternative has certain advantages.

- Direct contracting – A direct contract between the sponsors/owner and membrane supplier is more transparent for the sponsors/owner, and enables the sponsors/owner to have direct control over membrane quality and cost. The sponsors/owner, though, may not want to have the burden of administering this contract themselves
- Allocating responsibility to an operator – Handling membrane supply under the umbrella of the operation and maintenance (O&M) agreement with the plant's operator will have different consequences depending on whether the agreement is structured on a fixed-price or cost pass-through basis

In a fixed-price scenario, the O&M agreement must contain provisions that constrain the operator's ability to compromise membrane quality or delay replacement in an effort to reduce costs (and contribute to profit).

In a cost pass-through scenario, the sponsors/owner must control costs through the budgeting process and ensure that the operator is incentivized to make sure the plant continues to satisfy performance objectives, which will include keeping up with membrane maintenance. The sponsors/owner may in any event insist on approval rights over whom the membrane supplier is and over what types of membranes can be selected.

Concerns over water supply shortages are unlikely to abate, and desalination plants are likely to play an increasing role in the future mix of water supply.

While a number of issues specific to desalination projects make these projects unique, none of the four mentioned above have been insurmountable in practice. However, careful consideration by sponsors and lenders of these issues at an early stage of project development can prevent complications and delay, and ensure the ultimate success of the project.

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