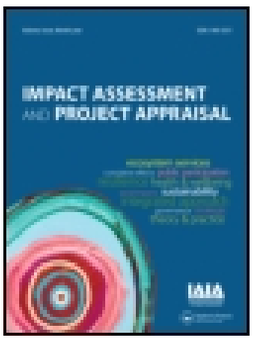

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Environmental management system provides tools for delivering on environmental impact assessment commitments

Dr. Bronwyn Ridgway

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Practice report

Environmental management system provides tools for delivering on environmental impact assessment commitments

Bronwyn Ridgway

In this paper the interrelationship among the development cycle of a typical engineering project, the EIA approvals process and environmental management systems is examined. It is suggested that small changes can be made to the way in which an environmental impact assessment (EIA) is presented to clarify the proponent's intent and to provide structured information that can be used in an environmental management system (EMS) to ensure that the predicted environmental issues associated with the project are effectively controlled. Experience with individual projects around the world has shown that streamlining the links between EIA and EMS can be achieved simply and successfully. The challenge for regulators and practitioners is to use this experience to revisit EIA and improve all EIA outcomes.

Keywords: environmental impact assessment, environmental management systems, project management, commitments, commitment register, performance tracking

Dr Bronwyn Ridgway is Environmental Adviser, PO Box 6027, Cromer 3193, Victoria, Australia; Tel: +61 4 19554088; E-mail: bpr@optusnet.com.au.

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ENVIRONMENTAL IMPACT assessment (EIA) is primarily a process to provide environmental information about a proposal to the proponent and to inform an 'in principle' approval (or rejection) by decision-makers at a time before significant resources are committed to the proposal's development. Over the last 35 years, EIA has evolved into a myriad of different formats around the world, many with common characteristics and others that have quite specific differences.

Formalized environmental management systems (EMS) have been used for a little over a decade with the most common, ISO 14001,[1] in place since 1996 and issued in an updated format in 2004 (ISO, 2004). Experience in EMS implementation has matured significantly over recent times with a growing number of organizations using them as the basis of their day-to-day operational environmental management. In contrast to the evolution of EIA, the introduction of EMS via an international standard has maximized the opportunity for a broadly consistent approach to implementation.

Now that considerable experience has been gained in EMS, it has become clear where its boundaries do, and do not, intersect those of the EIA process. Even more importantly, it is becoming clear how some of the simple and effective environmental management tools from the EMS toolbox can be used to assist in the delivery of EIA outcomes. It is also clear that these EMS tools are even more effective where organizations involved in the project (the proponent, their construction contractors and the final operators of the project) already utilize an

environmental management systems framework within their day-to-day business.

Streamlining the links between EIA and EMS can be achieved simply and successfully, as demonstrated by experience with various projects around the world. In this paper, the interrelationship among the development cycle of a typical engineering project, the EIA approvals process and environmental management systems is examined. Proposals are made as to how information from the EIA can be utilized in an EMS to ensure that the predicted environmental issues associated with the project are controlled effectively.

Project delivery and EIA

The development cycle of a major project is iterative and typically involves a large number of information gathering, analytical, administrative and decision-making steps (Ridgway, 1995):

- feasibility assessment
- project definition
- concept design
- approvals and permitting
- detailed design
- documentation
- procurement (purchasing)
- construction
- commissioning
- operation and maintenance
- decommissioning.

These steps can be consolidated into four main groups to help understand how the development cycle interacts with the EIA process. These are:

- planning (feasibility, project definition, concept design, approvals);
- design (detailed design and documentation);
- construction (procurement and construction);
- operations (commissioning, operation and maintenance).

It is the iterative, early planning and design stages of a major project that frequently involve, or interact with, EIA studies. During these periods in the project cycle, the proponent tends to allocate a modest budget to develop sufficient information about the project's design, construction and operations to feed into the EIA process and to use to make recommendations for impact mitigation and monitoring. Timelines and timing depend on the nature of the project and the EIA jurisdiction, but it is common for EIA studies to be on the project's critical path and undertaken well in advance, sometimes years in advance, of the proponent's final commitment to the project and the commencement of detailed design.

The amount of work undertaken 'in-house' by a proponent depends on the in-house resources available, the project contracting strategy adopted by the proponent and the stage of the project development cycle that the project is at. In the past, it was typical for many large proponent organizations to undertake much of the planning and design phase project engineering in-house and to contract out the EIA. With the move to 'de-skilling' of organizations, much of the design phase is now also commonly contracted out. The construction phase has been, and continues to be, almost always contracted out, whilst the operations management phase may or may not be managed in-house, depending on the management philosophies and resources of the proponent organization.

During an EIA, the proponent prepares a concept of the design to try to determine the key parameters that optimize the design and environmental constraints. These parameters include factors such as: the area of land required; rate of production; height of stacks; sizes of engines; and location of route. Personnel with construction expertise will predict likely construction methods, timing, workforce, and equipment requirements. Others with operational experience will forecast the operations and maintenance arrangements and demands. As much of this EIA information may be produced months or even years in advance of when the project is developed, the information is usually 'ball park' at best at this stage.

It is also common that many of the team members involved in the project planning and design phase will have little involvement with later phases of the project implementation, usually because of the different skill sets involved. In a similar vein, regulators responsible for the EIA are often not responsible for managing/enforcing the project implementation and/or operation once the project has received an approval.

Another factor to influence who is involved in the EIA and when it occurs in the development cycle is the evolution of alternative project delivery strategies.[2] These include contracting strategies such as: 'design and construct' (D&C), where the contractor completes the detailed design and construction in line with a design brief; 'build, own, operate (and

Environmental management systems streamline and systematize activities and services to deliver outcomes that aim to improve organizational environmental performance: they are usually committed to voluntarily by organizations and are inwardly focused

transfer)' (BOO, BOOT), where the contractor arranges the finance for the project and then owns and operates it for a period before transferring the rights back to the principal; 'engineering, procure and construct' (EPC, EPCM), where the contractor is engaged as an agent of the owner (project manager), who then engages design professionals and trade contractors to perform the work and so on.

The effect of these strategies tends to be that the contractor is introduced into the project cycle at an earlier stage than occurred previously, therefore modifying the interaction between the project development cycle and the EIA.

Linking EIA to EMS

Environmental management systems, as the name implies, streamline and systematize activities and services to deliver outcomes that aim to improve organizational environmental performance. They are usually committed to voluntarily by organizations and are inwardly, or management, focused.

EMS are most useful when tasks are performed repetitively within an organization and the approach to each task can be turned into a procedure or controlled, with specified steps aiming to minimize the risk of unforeseen environmental impacts. As such, EMS are almost always implemented by in-house personnel with day-to-day management responsibilities for environment and/or quality or safety.

The broad acceptance of the standardized EMS approach has had a number of important side benefits for the organizations that subscribe to them. In particular, the component elements of an EMS, the language and EMS terminology have broad consistency in their application from one organization to another. These can now, for instance, be commonly found in legal contracts and project documentation.

This is in contrast to EIA, which is usually imposed by local regulation not closely related to the day-to-day internal operations of the organization and where much of the work is often undertaken by personnel outside the proponent organization. These personnel will have appropriate scientific or planning expertise for undertaking EIA studies but may not necessarily be involved in the project during its construction or operational phases.

The links between EIA and EMS in most organizations are still weak. Figure 1 depicts the relative usefulness of well practiced EIA and EMS as tools to determine environmental outcomes for a project during the different phases of the project cycle. In the early planning phase, it is the risk identification and assessment tools of the EIA process that are of most value. Once the proponent has the EIA-related approval and the project moves on through the development cycle, the usefulness of the EIA and its outputs gradually decreases and EMS becomes more important as a determinant of successful environmental outcome. The EIA findings and approval conditions become inputs to the design, construction and operational phases and it is these latter two phases that have the potential to derive the greatest benefits from being undertaken under the umbrella of an EMS.

Once construction commences, the nature of the work becomes much more proceduralized. Appropriate contracting strategies can be used to allow for construction-related approval conditions, such as working hours, noise limits, dust control and pollution monitoring to be built into the EMS of the construction contractor. By the time the project is in the operations phase and under the management of the owner/operator, it is the EMS that has become the key tool for ongoing environmental management. The opportunity for the project EIA to influence day-to-day management at this point is limited.

While the above analysis outlines the usual interrelationship between EIA and EMS throughout a typical project cycle, it is worth noting that there are

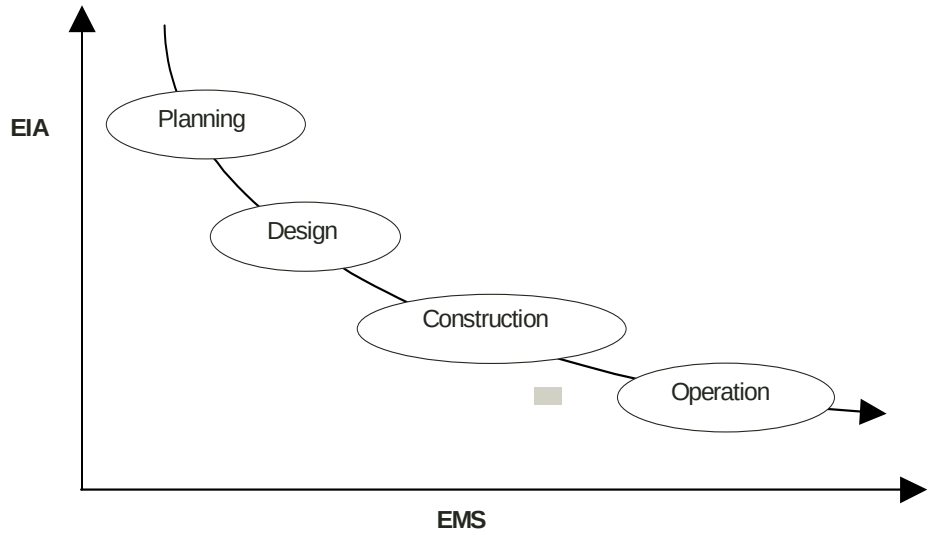

Figure 1. Relative usefulness of EIA and EMS by project phase

some proponents that are regularly undertaking large-scale EIAs and also have very well developed and mature management systems driving their day-to-day operations. These proponents are typically in the area of large-scale infrastructure and services, for instance, oil and gas, mining, power and major transport developments, such as the UK-based utility SP PowerSystems described by Marshall (2004). For these organizations, the process is more of a continuum as they have moved towards relatively successful merging of the EIA and EMS functions, as shown in Figure 2. It is experience in these sectors that provides the greatest insight into how EIA and EMS can be used side-by-side to obtain optimized outcomes.

Using EIA documents as inputs to EMS

Most proponents find the project management involved in the production of a synthesized coherent EIA challenging. The process is usually iterative, with large amounts of information generated by parties that are often external to the proponent organization.

Using EMS terminology, an EIA document or environmental impact statement (EIA document) is a 'record' (ISO, 2004, clauses 4.4.4, 4.4.5 and 4.5.4). Once it is finalized, the document does not change over time, making it problematic in terms of being a useful ongoing management tool. Whilst most EIA documents are very lengthy, the information they contain can usually be broken down into one of three types:

- descriptive information (for instance, descriptions of the site and its locality, the proposal, scoping and public consultation, the-non technical summary);
- analytical information (the approach to, and results of, studies, significance, conclusions and so on); and
- commitments or recommendations (for instance, mitigation and enhancement, and environmental management plans).

Whilst all three types of information are important to the decision maker there is no 'requirement' for a proponent to differentiate among them in their EIA document. It is the latter group, the commitment-related information that is particularly important to the proponent in terms of post-EIA project delivery. It is in their interest (and those of other stakeholders) for the EIA to be clear about what is a project commitment and what is not, and particularly to be able to communicate this to the proponent's own internal personnel: then the commitments can be clearly reflected in the documentation and systems that will be required to deliver on them.

Some jurisdictions generously only require proponents to provide "[a] description of the measures envisaged to avoid, reduce and if possible remedy significant adverse effects" (European Commission, 1997) while others want more. It is within the author's own experience to have a government use an individual sentence within an EIA document that was slightly ambiguous to require a proponent to undertake additional works post project-completion where these works were never envisaged by the proponent. In jurisdictions such as this, the lack of clarity around commitments can obviously become a cause of concern to the public, who may read particular expectations into statements made in the document.

One practical approach to managing commitments for proponents is to review the EIA and specifically 'tag' or log each one to make it absolutely clear to the reader which statements are clearly commitments and which are providing descriptive, but non-binding information. Tags can also be coded to assist in tracking where in the EIA document the commitment has been made.

To be even more useful during the implementation phases of a project, it is possible for the proponent to create a simple register of the 'tagged' commitments using readily available electronic tools such as databases and spreadsheets. Actions can be listed and responsibilities allocated for their completion. These tools can be used to track, sort and/or filter information and to assist in ensuring the timely completion of tasks. The register that is developed can be included in the EIA document. This is the approach taken in the Western Australian *PER/ERMP Guidelines for Preparing a Public Environmental Review/Environmental Review and Management Programme* (EPA, 2004)

Whilst the commitment register in itself forms a practical aid for tracking promises, it is even more

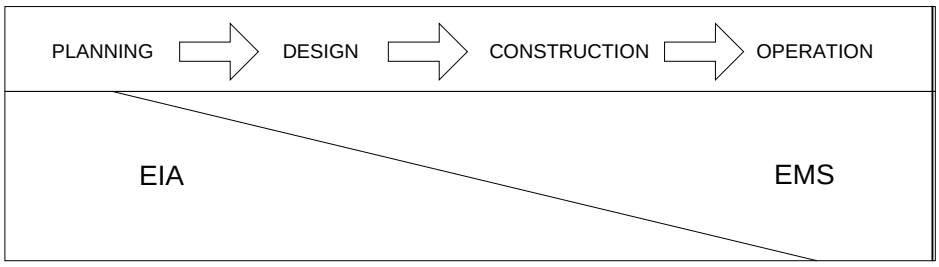

Figure 2. Relative usefulness of EIA and EMS in organizations with significant experience in using both tools

Table 1. Example of a typical simple commitments register (environmental management program)

Reference number	Description	Source reference	Responsibility	Action required by (or date)	Actual close out
1	Construction hours to be limited to 7am to 6pm	Meeting minutes, Community meeting number 5	Fred Smith	To be written into construction contract conditions	
2	Emission stack height to be at least 10 m	EIA section 6.2.1	John Azuk	Prior to completion of detailed design	
3	Noise testing of plant to show noise levels less than 40dBA at night	Minister's approval condition number 5	Inga Sud	Before operating license issued	
4	Compaction testing results to be sent to EPA	EPA audit report 10 November	Sam Brent	Within 20 days of commencement of commissioning	

useful if the register can be linked to the various EMPs, EMSs and other contract documentation that may be associated with the project implementation.

In EMS terminology, a commitment register of this nature is an example of an environmental management program (ISO, 2004, clause 4.3.3) and can be managed as an EMS 'document' (ISO, 2004, clause 4.4.5). Once it forms part of an EMS framework, there is a requirement to maintain (keep up to date) the register and add to it over time. For instance, the regulator's approval conditions can be added once the project is approved, as could new mitigating actions arising out of any risk assessments carried out during project design. Similarly, actions can be 'closed out' once complete. An example of a simplified commitment register can be seen in Table 1.

The 'sort' function of the register can be used to provide information for various contracts or roles and, for larger organizations with multiple sites, the register can be added into the organization's overall tracking system with an extra column added to provide a project reference. This approach is typical of that used by the safety profession in tracking hazards and provides a very practical and simple tool to keep track of information.

From a rather simplistic perspective, the delivery of the actions contained within a commitment register such as that shown in Table 1 is all that is required to track that commitments are implemented (and similar to that suggested in the Western Australian approach). However, as discussed earlier, most major projects are divided into a number of phases and delivered through a variety of contracts. The successful implementation of commitments can be assisted if the register is further divided according the following three categories as shown in Figure 3 (after Ridgway, 1999):

- design commitments (such as heights, locations, sizes of stacks, colors and so on);
- management commitments (such as operating hours, noise levels, discharge limits, donations and so on); and
- monitoring commitments (pollution monitoring, flora and fauna counts and so on).

Design commitments are those things that are built into the design of the project and can be delivered early in the project cycle. They are written into typical contractual documentation, such as the design brief, tender brief, basis of design, and scope of

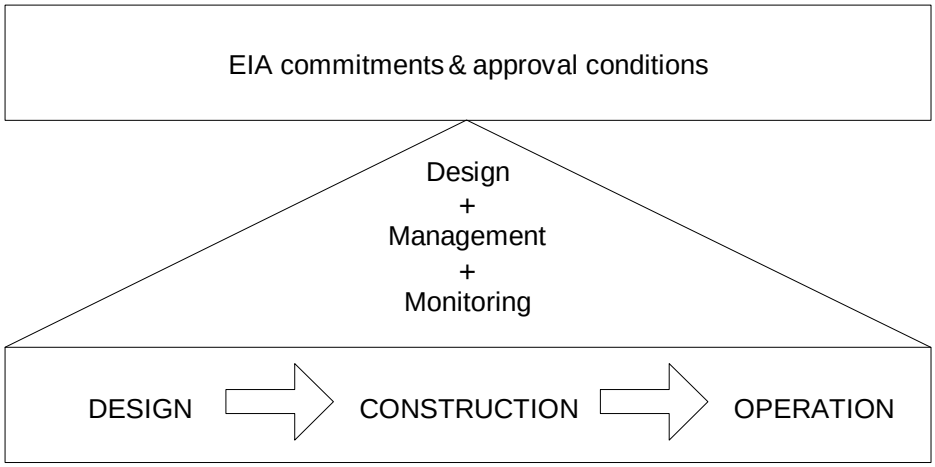

Figure 3. Categories in division of register

The flexible, yet powerful, electronic-based commitments register can be used to sort individual commitments according to contract and/or type, thus enabling cross-checking, to ensure that the requirements are built into the correct contracts and that appropriate procedures and plans are developed

work, to make sure that they are implemented by the design team. It is worth noting that the design team also needs to be aware of other commitments that may not appear to be directly related to their scope. For instance, they may need to know of the requirement to include air-monitoring ports in emission stacks if the design needs to allow for subsequent emission monitoring for operational or regulatory purposes.

The management and monitoring commitments are usually associated with the construction and/or operational phases of the project. How, or when, something will be done, such as using secondary containment when storing fuels on site, is a management commitment and is usually actioned through the development of a operational control procedure (ISO, 2004, clause 4.4.6). Similarly, monitoring requirements can be proceduralized (ISO, 2004, clause 4.5.1) within the EMS of the construction contractor or operator.

The commitment register seen earlier in Table 1 can be modified by adding columns to reflect the project phasing and commitment type: this assists in the implementation and audit of the commitments. The responsibility for action can also be allocated to a project phase or even to a major contract. An example of how this could be done is shown in Table 2; it can be seen to be similar to the tabulated approach adopted by PowerSystems and described by Marshall (2002).

The flexible yet powerful functionality of an electronic-based commitments register can be used to sort individual commitments according to contract and/or type, thus enabling cross-checking, to ensure that the requirements are built into the correct contracts and that appropriate procedures and plans are developed.

Performance tracking

Once the project is underway, the proponent will be keen to be able to demonstrate that they have met all the project completion conditions so that they can be issued with any operating licenses that may be pending. They will also be keen to ensure that their contractors have built into the project all the measures that have been paid for.

The proponent can use the commitment register to track commitment implementation by building the auditing and reporting requirements into the internal management systems of the project (ISO, 2004, clauses 4.5.5 and 4.4.3). On a large-scale project, the proponent would build commitment-register implementation audits into the hierarchy of project audits. Each of the major contractors would typically be responsible for undertaking independent audits against their 'sort' of the register and reporting on the implementation of the commitments as they relate to their contracts.

These audit reports would then be collated by the proponent into an overall report. Audit schedules and scopes, including nomination of which parties

Table 2. Modified commitment register (EMP) to show project phasing

Reference number	Project phase			Commitment type	Description	Source reference	Responsibility/ contractor	Action required by	Action date or project milestone	Actual close out	Comments
	Design	Construction	Operations								
1		C		Management	Construction hours to be limited to 7am to 6pm	Meeting minutes, Community meeting number 5	Fred Smith, Construct It	To be written into construction contract conditions			
2	D			Design	Emission stack height to be at least 10 m	EIA document section 6.2.1	John Azuk, Design Plus	Prior to completion of detailed design			
3		C		Monitoring	Noise testing of plant to show noise levels less than 40dBA at night	Minister's approval condition number 5	Inga Sud, Construct It	Before operating license issued			
4			O	Monitoring	Compaction testing results to be sent to EPA	EPA audit report 10 November	Sam Brent, Ubutte Management Group	Within 20 days of commencement of commissioning			

are required to undertake the audits (for instance, independent third parties) all form part of the contract documentation for the project, particularly if independent third-party verification audits are required by the regulator.

Where performance is not as expected, appropriate corrective actions need to be agreed and these would be built into the updated environmental management program.

It also would be feasible for regulators to make approvals conditional on the implementation of the commitments in the register and to require the proponent to audit and report progress externally against the implementation of the commitments. 'Stop points' or 'toll gates' can be established to ensure that the proponent does not proceed further without adequate proof of commitment implementation.

Conclusion

An opportunity exists for proponents to enhance the effectiveness of the implementation of EIA and to improve the delivery of EIA commitments through the use of environmental management systems tools and approaches.

This paper has shown that, if a proponent prepares a commitments register as part of an EIA, it can effectively define and communicate their intentions to all interested parties including internal stakeholders. Project management tools contained within an EMS can then be used to assign, track and close out these commitments during the detailed design, construction, installation and commissioning phases of the project. Phases of a project are often performed under contract by second party entities.

The use of EMS tools can also assist regulators to monitor and improve on the delivery of EIA outcomes, particularly when approval conditions are integrated into commitment registers.

In practice, the links between EIA and EMS can be made quite simply and, when implemented, they offer a cost-effective, logical and systematic approach to ensuring that projects deliver on the environmental expectations of proponents, regulators and the public.

Notes

1. This paper refers only to ISO14001 environmental management systems; however, there is no reason why the comments made are not equally applicable to management systems developed under the European Union's Eco Management and Audit Scheme (EMAS).
2. Note that, in some countries, some of these project delivery modes are prohibited.

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