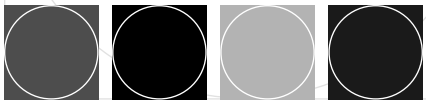
Report of the Ministerial Advisory Committee for Educational Renewal



Education for Sustainable Futures: Schooling for the Smart State

Report to the Queensland Minister for Education and Training and Minister for the Arts on Education for Sustainability in Queensland Schools

November 2006

Queensland the Smart State

Queensland Government
Department of **Education, Training and the Arts**

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Background

In September 2004 the then Minister for Education and the Arts announced the establishment of the Ministerial Advisory Committee for Educational Renewal (MACER). Membership of the MACER includes leading educators, union representatives, academics, education, arts, science, social science and human service experts.

In early October 2004, MACER held its inaugural meeting. At the March 2005 MACER meeting, the committee resolved to establish a working group to address concerns regarding education for sustainability.

Terms of reference

To further support students, families, school administrators and teachers, the Ministerial Advisory Committee for Educational Renewal will examine, provide advice and make recommendations to the Minister for Education and the Arts on:

- The key education for sustainability issues/challenges for the education sector.
- How these issues are being addressed in other education systems, both nationally and internationally.
- The ways in which these issues/challenges could be taken up across Queensland.
- The risks of not acting on these issues/challenges.
- Priority issues for education and suggested ways forward.

Introduction: the global move for change

The United Nations agreed to inaugurate in 2005 a Decade of Education for Sustainable Development (DESD). In launching the DESD, UNESCO Secretary-General Koichiro Matsuura said that the goal of 'a sustainable planet and a safer world for our children, our grandchildren and their descendants' requires us to embed the principles of sustainable development into education at all levels. The UNESCO International Implementation Scheme sees the DESD as a means of achieving 'a world where everyone has the opportunity to benefit from a quality education and learn the values, behaviour and lifestyles required for a sustainable future and for positive social transformation' (UNESCO 2005, p26). 'This means that education will have to change so that it addresses the social, economic, cultural and environmental problems that we face in the 21st century', Matsuura said (*National Commission for UNESCO 2005*, p2).

The stated aim of DESD is to integrate sustainability into education at all levels and across all sectors 'in order to enhance and transform societal capacity for sustainability'. The expectation in the Australian context is that the decade will achieve tangible improvements in three areas:

- the conservation of Australia's natural resources, biodiversity and ecosystem health
- the vitality and prosperity of Australian business and industry while respecting the capacity of natural systems
- active participation of citizens of all ages for harmony within Australia's social and cultural diversity (*National Commission for UNESCO 2005*, p16).

The Australian government is currently developing the national response to UNESCO's call for significant changes to education. As the UNESCO document says, education for sustainability is 'fundamentally about values, with respect at the centre: respect for others, including those of present and future generations, for difference and diversity, for the environment, for the resources of the planet' (UNESCO 2004, cited in *National Commission for UNESCO 2005*, p3). Education 'enables us to understand ourselves and others' as well as 'our links with the wider natural and social environment', the document adds, 'and this understanding serves

as a durable basis for building respect' (ibid). In endorsing the DESD the Chair of the Australian National Commission for UNESCO, Queensland academic Professor Ken Wiltshire, argued that the approach will 'help people better understand the world in which they live, and to face the future with hope and confidence, knowing that they can play a role in addressing the complex and interdependent problems that threaten our future' (*National Commission for UNESCO 2005*, p1).

That is the motivation for change. As Appendix 1 shows, there is increasingly persuasive evidence that the way we are now living is not sustainable. It is entirely feasible to achieve a transition to a sustainable future, but it will require significant changes. As Professor Wiltshire said, sustainability is not a technical concept but an educational one. Achieving the goal of a sustainable future 'involves learning how to make decisions that balance and integrate the long-term future of the economy, the natural environment and the wellbeing of all communities, near and far, now and in the future', he added (ibid). This is a challenge for society as a whole, including our social and political institutions. Building sustainability principles into education will not achieve all the necessary changes, but it is one essential component of a sustainable future.

This report adopts that challenge and sets out the principles for building sustainability into the education system in Queensland. As UNESCO (2005) states, this demands a review of curriculum, pedagogy, assessment and institutions. The task is formidable, but it is also truly urgent: nothing less than the future of our society is at stake. It is based on the maxim that a sustainable society is one that can persist over generations: in other words, a society that maintains both the physical and social systems that support it.

No educational system has been found to embody all these ideas. Sterling (2004, pp65–66) notes that Learning for a Sustainable Future was set up in 1991 to develop materials that would influence the curricula in the various provinces of Canada. The same author endorses the Haga Declaration, an initiative of 11 governments in the Baltic region of Europe, who agreed in 2000 that Education for Sustainable Development 'should be included in all curricula', 'should rest on a broad scientific knowledge' and 'be both integrated into existing disciplines and developed as a special competence' (Sterling 2004, pp63-64). The declaration goes on to call for an integrated approach to economic, environmental and societal development as an important tool for shifting the pattern of production and consumption to a sustainable basis (ibid).

The New Zealand Parliamentary Commissioner for the Environment reported recently on education for sustainability, saying 'We need to learn why it is important to live within nature's limits and to understand the many factors that contribute to unsustainable practices and lifestyles. The learning needs to be deeply embedded in all our formal and informal structures of education.' (PCE 2004, p4)

Educational principles

Our capacity to become a sustainable society can only be achieved through education. As Huckle and Sterling (1996) argued, the unprecedented changes that we need require education 'to play a key role', and 'education will itself be transformed in the process'. As the foreword to Queensland Environmentally Sustainable Schools Initiative (QESSI) states, 'education is the key, providing both awareness of the problem and, more importantly, the capacity to find solutions'. So education for sustainability must encompass, in terms of content:

- understanding of the impacts of human activities on natural systems
- awareness of the finite scale of non-renewable resources
- awareness of the limits on use of renewable resources
- understanding of the need for durable economic activities
- awareness of the consequences of increasing social inequality
- understanding of the importance of cultural traditions, beliefs and practices.

In terms of developing capacities, education should aim to give young people the ability and confidence to shape their own futures, rather than passively accepting futures imposed on them by external forces. The 'Smart State' agenda is one example of this approach, because it consists of choosing a different future from the role of being a commodity exporter and importer of value-added goods and services. Education should also aim to instil an appreciation of our moral responsibility toward other species and future generations. Perhaps the best metaphor for the outcome we should be seeking is *globo sapiens*, a term developed by Patricia Kelly for use in education from an idea originally proposed by Finnish futurist Pentti Malaska. Our goal should be to produce wise global citizens, aware of their responsibility to the rest of humanity, to the other species with which we share this planet and the future generations for whom we hold it in trust.

UNESCO (2005) argued that education for sustainability should have the following six characteristics:

- inter-disciplinary and holistic, embedded in the whole curriculum
- values-driven embodying the values and principles of sustainability
- critical thinking and problem-solving, developing confidence to tackle the complex challenges we face
- multi-method, using word, art, drama, debate, and experience, different pedagogies as appropriate to the tasks and the learners
- participatory, with learners involved in choosing how they will learn
- locally relevant, addressing local issues as well as global, building on the learners' experience and using the language[s] they understand best.

This raises the fundamental issue of values. Education will always have a values basis, whether implicit or explicit. Sterling (2004) argues that education for sustainability must be based overtly on the appropriate values (such as those outlined in the draft statement for sustainability provided as an attachment to this report). The foreword to his book, written by David Orr, argues that a 'mountain of scientific data' shows the damage we are doing to the natural systems of the earth, while we see every night in news bulletins the 'human tragedies' of poverty and violence. 'But only those equipped to think critically will understand both the magnitude of the problems and the choices to be made if we are to create a decent and humane future', he says (Sterling 2004, p7). Orr argues that the key to making wise choices that will help produce a sustainable future is replacing the 'paradigm of human domination' with a new one that 'places us in the web of life as citizens of the biotic community' (ibid, p8). This change of values is needed, he argues, for us to recognise our responsibility as global citizens, rather than seeing ourselves as 'isolated, self-maximising individuals'.

What this means for schools

Queensland schools have already made considerable steps toward embedding the principles of sustainability into both the formal curriculum and the overall operation of the schools, especially at the primary level. MACER recognises these steps and wants to commend the dedicated work of many teachers, parents and other members of school communities. As noted earlier, embedding education for sustainability in all Queensland schools will require a systematic and comprehensive approach, along with considerable political will.

The United Nations Decade of Education for Sustainable Development (DESD), which runs from 2005 to 2014, provides a framework for achieving this. The DESD recognises that young people acquire education not only through formal engagement with the curriculum, but also through their holistic experience as learners living within the school community. Effective education for sustainability is, therefore, not just a curriculum or pedagogical issue; it requires the involvement of the whole school community, both within and outside the school grounds.

The whole school community has a role to play in constructing and sustaining education for sustainability: the leadership team, the administration staff, the teaching staff, the grounds staff, the canteen staff, the parents, the students and the local community. External agencies can provide funding, support and advice, but it is the discussion, dialogue and reflection that occur within the school community — both internal and external to the school — that will drive the change. In turn, the changes in schools inevitably catalyse broader changes in the surrounding community. Implementing a whole-school approach to education for sustainability thus requires the development of a shared vision, goals and objectives.

In this regard, the MACER working group supports the recently released National Environmental Education Statement (NEES) for Australian Schools — *Educating for a Sustainable Future* — described as a 'vision of education that seeks to empower people to become responsible for creating a sustainable future.'

For many years environmental education has sought to develop students' understanding of the environment and to establish an ethic of caring towards the natural world. It has also recognised the need to engage with many different interests in society in order to tackle environmental issues. Environmental education for sustainability acknowledges what has always been true, that our culture and our world view affect how we perceive the world and interact with our environment. In other words, the whole notion of the environment necessarily involves our cultural values. So we now include in our environmental regulation the protection of places of national heritage significance, based on their natural, cultural and Indigenous values.

As we work towards achieving the goals of the DESD, schools will have an important role in preparing and empowering students to assume responsibility for creating and enjoying a sustainable future. Such a vision for school education is transformative. It is more than just a curriculum issue and requires a whole-school approach as well as innovative teaching and learning.

The 1999 Adelaide Declaration by Australian Ministers of Education included the following goal:

> When students leave school, they should have an understanding of, and concern for, stewardship of the natural environment, and the knowledge to contribute to ecologically sustainable development.

Education for sustainability is not limited to the study of Science, or Geography, or Studies of Society and Environment [SOSE], or any particular key learning area. It also develops cognitive skills and capacities such as critical analysis, creativity, problem solving, synthesis of information and appreciation of ethics and social justice, as well as effective communication, collaboration and change facilitation skills. Education for sustainability will ensure students understand the complexity of the world in which they live and have the necessary knowledge, skills, values and capability to make wise decisions about environmental and development issues.

As Professor Ken Wiltshire said, education for sustainability must involve:

- knowledgeable, caring and committed teachers who embrace an ethic of sustainability and make it an all-pervasive part of their teaching — just as we have come to do with the ethics underlying multicultural, anti-racist and gender-sensitive education
- regular access to and participation in professional development
- use of a wide range of learner-centred teaching strategies appropriate to developing the 'heart' (values) and the 'hands' (action) as well as the 'head' (cognitive learning) (*National Commission for UNESCO 2005*, p1).

Vision 1[1]

A shared vision is an important element of a whole school approach to environmental education for sustainability. The vision has implications for how schools are organised and the roles that are assumed by administrators, teachers, parents and students. It envisages:

Schools as:
Flexible learning organisations where the concepts of sustainability and community are central, and where all members of the school community are encouraged to live in ways that are attuned to the health of the community and its interrelationship with the environment.

School leadership teams as:
Supportive, proactive and actively involved in implementing and developing all aspects of education for sustainability in the school. School leadership is defined in a broad sense that is inclusive of parents, students and wider community members.

Teachers as:
Enthusiastic about developing effective learning relationships with their students, other staff members, parents and community members; committed to the goals of education for sustainability – teachers who are themselves lifelong learners; adaptable, and open to new ideas.

Students as:
Active, self-directed and collaborative learners – ethical and responsible young citizens, already able to take action for sustainable futures.

For a vision to be a powerful force for change it needs to be shared and owned by whole school communities, so the leadership teams should be understood broadly, including parents and other members of the local community as well as senior school staff. Shared visions are part of the regular planning and renewal processes of schools.

[1] Department of Environment and Heritage (2005)

MACER supports the following goals of the National Statement.

Goals[2]

The long-term goals of environmental education for sustainability include developing the capacities of students

- to understand and value the interdependence of social, cultural, economic and ecological dimensions at local, national and global levels
- to reflect critically upon how this interdependence affects communities, workplaces, families and individuals and so be able to make appropriate decisions
- to develop attitudes and skills which are conducive to the achievement of a sustainable future
- to appreciate and respect the intrinsic value of the whole environment, and have a sense of the intrinsic importance of the natural world
- to develop an ethic of personal responsibility and stewardship towards all aspects of the environment
- to participate as active and involved citizens in building a sustainable future.

A whole-school approach

For education for sustainability to be effective, it must pervade all aspects of schooling: curriculum, teaching and learning, physical surroundings, and relationships with the local community. Education for sustainability needs to be a core feature of the school ethos, underpinning the value structure of the school. It may assist if it is explicitly written in policy documents, but it will best be observed in how administrators, teachers, students and parents interrelate; in how the school presents itself and responds to its local community; in the nature of the programs offered to students; and in how the school embodies the principles of environmental citizenship in the way it operates as a learning community.

A whole-school approach to environmental education for sustainability emerges from a shared school vision and encompasses school design and school governance, as well as resource management and usage (water, energy, products and materials).

[2] Department of Environment and Heritage (2005)

School governance

Good governance is central to education for sustainability. Strong support from school governing bodies can ensure physical and human resources are used in economical, environmental and socially sustainable ways. Governance for sustainability requires participatory decision making that is inclusive of all stakeholders, including students. Good governance is vital for strong networks that contribute to social cohesion and for partnerships that embed a commitment to education for sustainability within the whole school. Sustainable schools will engage their communities in participatory planning, reflection and evaluation processes to ensure continuous improvement. Good governance will also distribute decision making and leadership across the school community, involving staff, students, parents and community members.

Resource management — reducing our ecological footprints

A school's daily operations present opportunities to teach sustainability through an active commitment to reducing resource usage and conserving environmental and heritage values. This will involve attention to waste reduction, energy minimisation, transport, and water usage, recycling, increased biodiversity in the school grounds, sound purchasing practices, and environmentally appropriate tuckshop packaging and practices. Cost savings can be used for other sustainability initiatives.

School grounds and facilities

Increasing biodiversity and vegetation cover in school grounds will increase the quality of the grounds for educational and environmental experiences for students. The changes envisaged will present opportunities for school communities to contribute to sustainable management of school grounds and facilities through activities such as permaculture, habitat creation, 'learnscapes' (educationally orientated landscapes), recycling, composting and litter management.

Networks and partnerships

Collaboration with the local community is an essential component of a successful whole-of-school approach to education for sustainability. Community groups, local councils, industry, businesses and other educational institutions could be potential partners in the implementation of education for sustainability in schools.

Students will then see the links between their learning for sustainability and local environmental and social issues. This will enable students to become active and informed citizens, capable of creating and participating in a future sustainable society.

Productive partnerships can flourish to provide schools with supplementary resources for sustainability initiatives, either cash or in-kind, beyond those normally available for schools. Through students being actively involved in and with their local community, they will be encouraged to see themselves as caretakers of their school's cultural and social heritage, as well as creators of sustainable futures.

Curriculum and essential learnings

The 1993 P–12 Environmental Education Curriculum Guide, developed by the then Department of Education, is still a contemporary document. The focus of environmental education in this document was on a sustainable society. The emphasis was on respect for others, our place and ourselves. These principles need to be integrated into the development of the essential learnings for education.

Tasmania's Department of Education (2005) has developed a set of essential learnings that focuses on thinking, communicating and personal futures, which all have a relationship with the principles of sustainability. Two of the essential learnings have a specific emphasis on education for sustainability, that is, **Social Responsibility**, where the students are encouraged to be responsible citizens who value diversity and take an active part in their community, and **World Futures**, where the students understand developments in scientific and technological innovation as well as being aware of their environment.

Curriculum, assessment and reporting in Queensland need to incorporate concepts and principles of education for sustainability including[3]:

- our **natural environment**, consisting of complex ecosystems which form the basis for our existence on planet earth
- **biodiversity** of life on earth, which includes cultural, biological, social and economic forms of diversity and the importance and value of these for the quality of human life we all enjoy
- **interdependence** between humans and their environment because we are a part of a system that connects individuals, their cultures and their natural environments
- **resource management** of our renewable and finite resources, recognising that we depend on these resources for our current quality of life and they are critical for the sustainability of human civilisation
- **cultural and creative environments** require protecting as tangible and intangible evidence of human activity, including buildings, traditions and beliefs
- **values and lifestyle choices** are at the centre of society's pressure on our natural ecosystems, and poor environmental choices may affect the wellbeing and lifestyle of future generations
- **social participation** based on positive attitudes and concerns for the environment is required to motivate people to develop the skills and necessary actions for environmental problem-solving.

Environmental economics also needs to be incorporated into reviews of syllabuses so that they incorporate the real costs of development, the concept of inter-generational equity and the problems arising from traditional discounting of the future.

These principles should also be integrated into all syllabus improvements and curriculum implementation processes.

[3] Adapted from: Department of Environment and Heritage (2005)

Professional development and training

Learning related to education for sustainability often involves abstract concepts, such as the precautionary principle, and anticipatory approaches to decisions and actions. Therefore, professional development and training for staff is critical so that these abstract concepts are meaningful to their everyday lives and practical experiences. These principles and concepts of education for sustainability may be relatively new for most staff and school communities, so tailored programs for specific cohorts of staff are critical if a sustainable society is to be achieved.

Associate Professor Tilbury states in the *Whole-school approaches to sustainability international review* that 'professional development of teachers, in particular, is a critical component to whole-school approaches to sustainability … few teachers have the knowledge and capacity to develop environmental education or education for sustainability pedagogies in schools effectively.' It will also be critical to train staff in sustainability principles, purchasing procedures, improving biodiversity in school grounds and cleaning procedures that minimise the impact on our environment.

Recommendations

With this report on Education for Sustainability, MACER advises the minister to consider the following recommendations. These recommendations are based on the arguments presented above.

With due cognisance to the work of the United Nations Decade on Education for Sustainable Development and the National Environmental Education Statement, and in the light of some exemplary initiatives by schools, MACER recommends that:

1. **All Queensland students be educated to be active and informed citizens, aware of the rights and obligations of citizenship, as well as being capable of creating and participating in a future sustainable society.**

   This is the long-term aspirational goal. As discussed above, it involves not just curriculum changes but adapting the way we build and operate schools, the way they interact with their local communities and the values they embody.

2. **The Department of Education, Training and the Arts (DETA) work with the three schooling sectors to develop a Statement on Sustainability for Queensland Schools based on the principles for sustainability outlined in the draft statement provided by MACER.**

   The Statement on Sustainability should be a one-page summary in plain language. It is vital for those responsible for the education sectors of schooling in the state to be involved in the development of the statement. A first draft is attached for further consideration and consultation.

3. **The DETA and school sectors be encouraged to develop a sustainability strategy including actions that will guide schools to incorporate a sustainable futures perspective in all facets of their respective strategic planning processes.**

   The sustainability strategies/action plans would set out the process of embedding sustainability into school operations for each sector.

4. **DETA and Queensland schools model the 'principles for sustainability' in corporate decision-making, curriculum planning and delivery, and the management of the environment and facilities in which all staff and students work and learn.**

   Within the context of recommendations 2 and 3 there should be a commitment to the rapid and comprehensive implementation of the principles of sustainability.

5. **The Queensland Environmentally Sustainable Schools Initiative (QESSI), through its regional hubs and member schools and the network of Outdoor and Environmental Education Centres, provide continued professional development and learning in 'education for sustainability' (as set out in the 'professional development and training' sections of this Report) to the staff and students of Queensland schools.**

   QESSI is a well-established network of schools, regional hubs and outdoor and environmental education centres. In the short term, this network should be used as the basis for the professional development needed to bring teachers and managers up to date on the issues involved in education for sustainability.

6. **All future improvements of the syllabuses for the key learning areas (KLAs), in particular SOSE, science, arts, health and physical education, should ensure each syllabus, and the essential learnings, reflect the principles of education for sustainability, as contained in the draft Statement on Sustainability for Queensland Schools provided by MACER.**

   It will be much easier to implement education for sustainability through the existing relevant KLAs, rather than developing entirely new curriculum documents. However, if the principles of sustainability are to be taught through these KLAs, it will be essential to ensure that the content and approach of the KLAs embodies the principles set out in the statement.

7. **School staff, including administrative assistants, grounds staff and tuckshop workers, as well as interested members of the local community, be made aware of the Statement on Sustainability, including the sustainability principles appropriate to their areas of work.**

   If we are expecting staff to work in different ways, there needs to be appropriate awareness raising. While this is obviously true for classroom teachers and school principals, applying the principles of sustainability to the entire school system will also require development of support staff.

8. **There be additional professional support from appropriately qualified personnel (beyond the teaching profession) for staff involved in education for sustainability, both in schools and in outdoor and environmental education centres.**

   Targeted support is most likely to be effective in the early stages of changing the approach to education for sustainability. Through train-the-trainer type programs, key staff across the state can help to facilitate and implement education for sustainability in all regions.

9. **School sectors provide professional development for educators and principals on evidence-based pedagogical practices and curriculum planning involved in education for sustainability.**

   Education for sustainability is a relatively new concept for many education staff. Therefore specific professional development is needed to assist in integrating the principles of sustainability into curriculum development and delivery.

10. **As part of their regular whole-school planning and review processes, schools develop school-based environmental management plans, with particular emphasis on resource management, school grounds improvement and curriculum integration of sustainability principles.**

    The most effective way to ensure that the approach spreads to all parts of the school's operation is through the development of comprehensive school environmental management plans as part of each school's planning and review cycles.

11. **Schools be encouraged to develop partnerships with industries, businesses and local communities to assist the process of embedding the principles of sustainability into their operations.**

    There are many examples of Queensland schools successfully developing partnerships to advance these principles. MACER encourages other schools to follow the lead of those schools.

12. **The tertiary education sector be encouraged to adopt a parallel approach of embedding the principles of sustainability into both curriculum and operation of institutions.**

    All of the arguments for change at the school level apply, *mutatis mutandis*, to the tertiary sector, which is educating the next generation of professionals. It is especially important that teacher education embrace the new approach, to equip teachers for the roles they will be expected to play in implementing education for sustainability. Accordingly, this report should be referred to the Queensland Teachers College for the consideration of its professional standards committee, which is developing new standards for teacher education course approval.

13. **A review of the implementation of sustainability strategies be undertaken in 2008 as a local contribution to the UN DESD.**

    Any systemic change should be monitored to determine its success and to identify any necessary modifications. Reviewing the implementation of new approaches is a good general principle, but it is especially important for changes as far-reaching as those proposed in this report.

Statement on Sustainability for Queensland Schools

Draft for consideration[4]

Sustainability has been defined as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs', or simply as 'enjoying the fruit without damaging the tree'.

As the Department of Education, Training and the Arts, we recognise that we all have an impact on the environment, economy and people of Queensland. Sustainability is good practice for the environment, but it is also good practice for our schools, our education system and our community.

Our vision is based on that agreed for the United Nations Decade of Education for Sustainable Development:

> 'a world where everyone has the opportunity to benefit from a quality education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation.'

A sustainable society will be based on a set of values including:

- respect, care and compassion for ourselves, others and our environment
- responsibility for our actions
- integrity of all life on earth
- understanding and inclusion of all perspectives.

We base our decisions and our practice on the principles of sustainability, including:

- protecting biological diversity and ecological processes
- taking a precautionary and anticipatory approach to decisions and actions
- striving for social and inter-generational equity
- encouraging and providing for community participation
- understanding the real, overall costs of development
- encouraging wise use of resources.

We can achieve a sustainable future society by working together, respecting culture, customs, social and environmental values.

This is our responsibility to all future generations.

[4] N.B. MACER believes the Department should develop this statement in collaboration with key stakeholders, so this draft is indicative of a starting point for further consultation.

Appendix 1

The evidence that we are living unsustainably

While there is still a vigorous debate in the broader community and at the political level, there is an increasingly loud warning from the scientific community that the way we are currently living is not sustainable. We are depleting resources that future generations will need, damaging environmental systems, reducing social stability and increasing the gap between rich and poor.

All our transport systems are now implicitly posited on the assumption that there will always be cheap, readily available petroleum fuels. Oil is the most urgent resource issue. Pessimists believe the peak of world oil production happened in the year 2000 (Holmes & Jones 2003). Optimists believe it might be as far away as 2010 or even 2020, but there is no substantial disagreement with the geological fact that the peak of world oil production will be reached by 2020 at the latest. After that the future will be one in which oil becomes steadily scarcer and more expensive. The change will force fundamental changes in energy use, particularly for transport.

Despite the tendency for the media to talk of an 'energy crisis', there is no energy shortage. The natural flows of solar, wind, wave, geothermal and tidal energy are orders of magnitude greater than any conceivable future energy demand. In fact, the amount of solar energy that hits Australia alone in one average summer day is about half the global annual energy use for all purposes (Lowe 1994a). In the short term, energy technologies like wind turbines and solar panels are more expensive, but they offer the prospect of sustainable energy supply into the foreseeable future at acceptable environmental cost.

There are other serious resource problems affecting even the most fundamental human needs of food, water and air. More than a billion people across the planet do not have access to fresh drinking water. Agricultural land is being lost to salinity, degradation and urban expansion. Through inadequate resource management, almost all the world's major fisheries are in decline. The world continues to lose forest cover at an alarming rate. Achieving a sustainable future for the world will necessarily involve far-reaching changes in the pattern of resource use.

A series of publications have documented the scale and seriousness of environmental problems. At the national level, two *State of the Environment* reports have now been published. The 1996 report highlighted our beautiful and unique environment, many aspects of which are in good condition by international standards. But it also pointed to some very serious problems, including loss of biological diversity, degradation of inland waterways and destruction of the productive capacity of rural land. Its final section linked the environmental problems to lifestyle choices, suggesting that the goal of sustainability will require integrating environmental awareness into all social and economic decisions. The second report, released in 2002, noted an improvement in urban air quality but found that all other critical environmental problems are getting worse, because the **pressures** on natural systems are still increasing. Each year the Australian

population grows by about 200 000, as the excess of births over deaths [about 120 000] is augmented by net inbound migration. The material expectations of people also increase each year; on average we use more energy, travel further in larger cars, live in larger houses, consume more resources and produce more waste. The compounding effect of more people, each on average demanding more, is putting greater and greater pressure on our natural systems.

The decline was confirmed in 2002 when the Australian Bureau of Statistics (ABS) released its report, *Measuring Australia's Progress*. It supplemented the standard economic data with indicators of social and environmental conditions for the decade 1990–2000. During that period all of the usual economic indicators showed positive trends. The social indicators were mixed, with some worrying negative trends, such as increasing inequality of incomes and growing numbers of children living in homes with no earned income.

Of the environmental indicators, only urban air quality improved. The report showed more land being cleared, more species threatened, declining river health, more degraded land and increasing greenhouse gas emissions. The obvious conclusion is that the increasing economic production from the natural systems of Australia is coming at a high environmental cost. Tim Flannery made this point about the unsustainable use being made of Australia's natural resources in *The Future Eaters*, conjuring the image of the present generation consuming the opportunities of future generations by our lifestyle choices. Two subsequent ABS reports have confirmed the trends: most economic indicators continue positive, but almost all the important environmental indicators show continuing deterioration.

Global studies draw the same conclusion. UNEP has now produced three reports in its *Global Environmental Outlook* series. They show some successes, such as the concerted international effort to curb emissions of chemicals that deplete the ozone layer and 'encouraging reductions in many countries' of urban air pollution. They also document what the third report called 'environmental challenges' — increasing emissions of greenhouse gases, over-exploitation of water, 1200 million people without clean drinking water and twice that number without sanitation, species being lost at an increasing rate, fisheries in decline, land degradation, acidification and eutrophication caused by increased release of nitrogen into natural systems.

The decade of global science drawn together in a 2004 report by the International Geosphere-Biosphere Programme, *Global Change and the Earth System: A Planet Under Pressure* paints a disturbing picture. It shows that human activities are affecting global systems 'in complex, interactive and apparently accelerating ways', so that we now have the capacity to alter those natural systems in ways 'that threaten the very processes and components … on which the human species depends'. The Millennium Assessment Report (MAR), released in 2005 by the United Nations, was the result of work by 1360 scientists in 95 countries, reviewed by 850 experts and government agencies (UN 2005). It noted that humans have changed ecological systems more in the last 50 years than in all our previous history, resulting in a large and mostly irreversible loss in biodiversity.

The figures are truly startling: more new land went under crops in the last 50 years than in the eighteenth and nineteenth centuries combined, new dams were built at an average rate of one a day to quadruple the amount of water impounded, more

nitrogen fertiliser has been used since 1985 than in all previous human history, the human population has doubled since 1950 but food production has increased by a factor of 2.5 and economic output by a factor of six. Biodiversity has been lost as a result of habitat destruction, introduced species and chemical pollution. Those pressures continue unabated, but they are now supplemented by climate change, calculated by the MAR to be the most serious factor causing species loss this century and could result in a loss of between 10 and 30 per cent of all mammal, bird and amphibian species this century. The recent rate of species loss is between 100 and 1000 times the average over the earth's history. That is a potentially catastrophic loss of biological diversity.

The MAR also noted that the number of people without adequate nutrition is growing, as is global inequality. More than a billion people live on less that US$1 a day, 70 per cent of them in rural areas where they are directly affected by the measurable decline in ecosystem services.

In *Resetting the Compass*, Yencken and Wilkinson (2001) suggested a guide for 'Australia's Journey Towards Sustainability'. After summarising the environmental problems we face, they argued that existing policies will not achieve a transition to sustainability because they do not address the growing pressures, as discussed above: increasing population and increasing material demands per person. So, they conclude, a population policy is essential, as is a commitment to 'dematerialisation', citing a German study which argued that Europe needs to reduce energy use by a factor of four and materials use by a factor of ten — and then adds that several European nations have adopted those targets! They support development of a Real Progress Indicator, rather than persisting in the delusion that the Gross Domestic Product measures wellbeing. More generally, Yencken and Wilkinson argue that sustainability has four dimensions — economic, social, cultural and ecological — which deserve equal attention. Along similar lines to Clive Hamilton's (2003) book, *The Growth Fetish*, they note that growth has costs as well as benefits, and argue that we should pay more attention to the **quality** of growth than the rate. It now seems apparent that we need to add a fifth dimension: resources. In the medium term, access to petroleum may be a crucial barrier to sustainability.

At the international level, there has been a growing awareness that a sustainable future will involve significant change. *Our Common Future* said that the world's economic and environmental futures are intertwined and should be seen as complementary, rather than in competition. *GEO2000* noted that the present course is unsustainable, so doing nothing is no longer an option. *GEO3* set out some of the principles for change by exploring four possible scenarios. In *Markets First*, globalisation and a liberal trade agenda promote rapid economic growth, but nations are increasingly unable to prevent the increasing environmental damage that typically comes with rapid economic growth. In *Security First*, the wealthy use force to suppress growing protest against ecological problems and a widening gap between rich and poor, creating a divided and violent world. In *Policy First*, governments take decisive action to curb environmental excesses, but it proves difficult to bring the material living standards of the poorer countries up to an acceptable level. The most hopeful scenario, *Sustainability First*, is based on a shift in values to reach consensus on satisfaction of basic needs for all within the limits of natural systems.

Couching the problem in those terms makes clear that the present world is a long way from having the **values** needed for the transition to sustainability. We also lack the knowledge base needed to be confident that we are interacting sustainably with natural systems. The approach was taken a step further in the report by the Global Scenarios Group, *Great Transition*. The report examines six possible futures: two conventional approaches, named as Market Forces and Policy Reform; two pessimistic futures, Fortress World and Breakdown; and two types of Great Transition, called Eco-communalism and New Sustainability. It says:

The scenarios are distinguished by distinct responses to the social and environmental challenges. *Market Forces* relies on the self-correcting logic of competitive markets. *Policy Reform* depends on government action to seek a sustainable future. In *Fortress World* it falls to the armed forces to impose order, protect the environment and prevent a collapse into Breakdown. *Great Transitions* envisage a sustainable and desirable future emerging from new values, a revised model of development and the engagement of civil society.

The report concludes that the *Market Forces* scenario cannot lead to a sustainable future because a combination of factors such as widening inequity and environmental degradation will undermine the social cohesion and international stability needed for the operation of orderly markets. The most likely result would be a slide toward a barbaric future, either Fortress World in which an elite is able to protect its lifestyle by armed force against a growing insurgency of the disadvantaged, or Breakdown with loss of the support systems needed for a civilised life. Great changes can in principle be made by a Policy Reform approach, which could dramatically cut resource demands and environmental consequences of our lifestyle. The problem is that the political will to implement such a strategy is nowhere in sight. The Hawke government sponsored an Ecologically Sustainable Development process, in which nine working groups developed approaches which would bring both economic and environmental benefits in the major sectors of the Australian economy. Nearly fifteen years later, the consensus recommendations in the *National Strategy for Ecologically Sustainable Development* have still not been implemented. As *Great Transition* says, policy reform has to overcome 'the resistance of special interests, the myopia of narrow outlooks and the inertia of complacency'. As long as most politicians are more concerned about the next election than the next generation, the necessary reforms will not happen.

The *Great Transition* recognises that market-led wealth generation and government-led technological change need to be supplemented and guided by a values-led move to an alternative global vision, based around such principles as equity. The report envisages the economy as a means of serving our needs within the limits of natural systems, rather than an end in itself. It assumes a technological transition based on the principles of renewable resources, efficient use and 'industrial ecology' — seeing the waste of one industrial process as the feedstock of another. It sees hunger being eliminated as a result of population stability and improved distribution systems to reduce waste. Above all, it sees a future form of **genuine** globalisation, in which we recognise that we share global resources and the natural systems of the planet with the entire human family, leading to a determination to seek equitable global solutions to the daunting problems we face.

The challenge of 'meeting fundamental human needs while preserving the life-support systems of planet earth' (Kates et al 2001) is now engaging thinkers from a range of backgrounds. The new field of sustainability science has emerged from attempts to understand the interactions between human activities and natural systems. It spans the full range of scales from the local to the global, recognising that land use is affected by the changing global climate and is also effecting change to the global climate, so interactions in both directions need to be considered. It explicitly transcends traditional disciplines, since many of our most serious environmental problems are the direct result of applying narrow specialised knowledge to one aspect of a complex system. It aims to improve our understanding of complex self-organising systems and their responses to multiple and often interacting stresses. It accepts that different observers with different values legitimately reach different interpretations of complex issues. By explicitly recognising the problem, it endeavours to enable the various social actors to work together toward common goals from their separate perspectives. It is seeking to answer some 'core questions', such as whether scientifically meaningful limits can be identified to warn when natural systems are at risk of serious or irreversible degradation. It is addressing specific short-term issues of concern, such as the effect of the recent pattern of 'development' on the Himalayas.

There are other international initiatives, such as the Resilience Alliance, which is attempting to define the conditions which determine the capacity of natural systems to cope with pressures (Resilience Alliance 2003) and the Global Scenarios Group, discussed earlier. So there is a reason for cautious optimism: the recognition that environmental problems transcend traditional political and intellectual boundaries has spurred a new approach that explicitly takes that into account. The sustainability science movement is a specific case of a general trend Somerville identified as trans-disciplinarity, 'embedding various streams of knowledge in one another and seek[ing] to re-create integrated knowledge' (Somerville 2000 p285). Somerville goes on to argue that one of the challenges of globalisation is 'to find a language and vocabulary that will cross the boundaries of religion, ethnic and national origin, and culture, [to] capture the profound shared realities of the human spirit that can give meaning to our lives' (ibid p286). In other words, the recognition that complex environmental problems are regional or global in scope is itself driving a new approach that explicitly takes that reality into account. Growing awareness of the profound implications of global change is promoting an evaluation of the values that are driving that change. So, market-led wealth generation and government-guided technological change has to be supplemented by a values shift towards a new global vision, committed to equity and marked by durability.

All around the globe, individuals and groups are striving to develop the social and institutional responses that will bring about a transition to a sustainable future. Achieving this transition is simply our moral duty to the countless millions of other species that share this planet, and the future generations for whom we hold it in trust. Ian Lowe's recent book, *A Big Fix*, takes this approach and sets out one possible approach to developing a sustainable future for Australia.

Appendix 2

MACER background paper — Scan of Significant International and National Environmental Education for Sustainability Initiatives by Education Systems

International

United Nations Decade on Education for Sustainable Development (UN DESD) 2005–2014 has the vision of a world where everyone has the opportunity to benefit from education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation.

www.portal.unesco.org/education/en/ev.php-URL_ID=27234&URL_DO=DO_TOPIC&URL_SECTION=201.htm

UNESCO has the lead role in the UN DESD and the latest Executive Board minutes published on 11 August 2005 (see attachment 1), states:

> The primary goal for the DESD is laid out in the United Nations General Assembly resolutions 59/237 in which the General Assembly 'encourages Governments to consider the inclusion … of measures to implement the Decade in their respective education systems and strategies and, where appropriate, national development plans'. Furthermore, the General Assembly 'invites Governments to promote public awareness of and wider participation in the Decade, inter alia, through cooperation with and initiatives engaging civil society and other relevant stakeholders, especially at the beginning of the Decade'.

National

1 1999 Adelaide Declaration by Australian Ministers of Education included the goal that:

When students leave school, they should have an understanding of, and concern for, stewardship of the natural environment, and the knowledge to contribute to ecologically sustainable development.

www.mceetya.edu.au/nationalgoals

2 The Commonwealth *National Action Plan for Environmental Education – 2000* is intended to provide leadership to many sectors involved in environmental education activities and importantly, promote better coordination of these activities. This plan is coordinated through the Commonwealth Department of Environment and Heritage (DEH). The significant actions from this plan are listed below.

www.deh.gov.au/education/nap/index.html

3 The development of the National Environmental Education Council (NEEC), which is a specific advisory group to the Federal Minister for Environment and Heritage.

www.deh.gov.au/education/neec/index.html

4 The establishment of the National Environmental Education Network (NEEN) in 2001 which comprises departmental representatives from all the State and Territory Education and Environment portfolios with the secretariat from the Commonwealth Department of Environment and Heritage.

www.deh.gov.au/education/neen/index.html

5 The production National Environmental Education Statement (NEES) was endorsed by MCEETYA in May 2005 and is published ready for distribution to every Australian School.

6 Establishment of the Australian Research Institute on Education for Sustainability (ARIES) which has the role of conducting critical research on education for sustainability across Australia and the world.

www.aries.mq.edu.au

7 The Australian Sustainable Schools Initiative (AuSSI) working group of NEEN has just conducted a national workshop with the aim to develop an AuSSI National Framework.

www.deh.gov.au/education/sustainable-schools/index.html

8 Values Education for Australian Schools has as one of its set of values — *Responsibility … to take care of the environment*.

www.valueseducation.edu.au/

State

Whole of Government Priority

1 The Queensland Government has the whole of Government priority of 'Protecting the environment for a sustainable future'.
www.premiers.qld.gov.au/About_the_department/publications/policies/Governing_Queensland/Policy_Handbook/frameworks/21_Whole_of_government_priorities

Curriculum

1 DETA's P–12 Curriculum Guide for Environmental Education was produced in 1993. This is still a contemporary document and is an excellent resource for schools.

2 The key learning areas of science, SOSE, technology, the arts and the senior syllabus subjects of science, geography and technology all contribute to environmental education for sustainability, especially with a futures perspective. New Basics also has an environmental education focus through the curriculum organisers of environment and technologies and active citizenship.

www.qsa.qld.edu.au

Outdoor and environmental education centres

1 The department has 25 outdoor and environmental education centres (O&EECs) that focus on Environmental Education for Sustainability for schools.

www.education.qld.gov.au/schools/environment/outdoor

2 The University of Queensland and the O&EECs have embarked on a two-year ARC Linkage research project to investigate their productive pedagogies and partnerships in the area of 'Learning for Sustainability'.

The Queensland Environmentally Sustainable Schools Initiative

1 The Queensland Environmentally Sustainable Schools Initiative (QESSI) Alliance Strategic Plan is a collaboration between the DEH and DETA, with strong support from the Great Barrier Reef Marine Park Authority – *Reef Guardian Schools* program, Keep Australia Beautiful – *Queensland – Green and Healthy Schools* program, Queensland Transport – *Travel Smart Schools* program, and other organisations and agencies that have environmental education for sustainability programs, products and services for schools.

www.education.qld.gov.au/schools/environment/outdoor/qessi.html
www.reefed.edu.au
www.kabq.org.au/qld/01_cms/details.asp?ID=7
www.transport.qld.gov.au/qt/ptinfo.nsf/index/travelsmart_kids

Facilities-related initiatives

Design guidelines

Strategic Asset Management Unit leads the Collaborative Ecologically Sustainable Development (ESD) Research and Implementation Team (CERIT) to establish a framework and action plans to address ESD issues in the future provision, management and maintenance of EQ facilities. A key CERIT goal is to establish draft ESD design guidelines for both new school development and to address practical facility solutions for existing schools. Draft ESD design guidelines are expected from extensive research on issues like landscaping and toilet construction and will include successful 'green school' pilots by other states.

Green School Project — Peregian Springs

Facilities Services Branch (FSB) has engaged Project Services to draft ESD requirements for a pilot P–7 'green school' anticipated to be established at Peregian Springs on the Sunshine Coast in the near future. Project Services in conjunction with Strategic Asset Management (SAM) Unit and FSB, has been requested to fully review the requirements for what a green school is. Outcomes including a cost benefit analysis of a range of ESD options/inclusions are expected by mid 2006 with comparative cost analysis to enable project decisions.

Utilities monitoring

Utilities usage in schools is monitored both by schools and Regional Facilities Managers. The current funding methodology for school utilities grants drives school performance, informs decision making at the school and acts as an incentive as utilities savings each year can be retained on a pro-rata two-year cyclical formula, and excessive usage is paid for at school level. Schools can request a one-off increase to their grant, due to circumstances beyond their control (such as broken pipes etc). This is assessed by facility officers who manage a database of utilities usage information, which provides state-wide historical information over several years.

Water management

The government has introduced the Queensland Water Plan 2005–2010 and is considering various initiatives put forward by lead agencies on water management. In particular the Government Building Water Conservation Program (GBWCP) and the Department of Natural Resources and Water are conducting reviews of water usage and through consultation, developing suitable strategies for all agencies to meet proposed water savings targets expected to be imposed. Agency workshops and research advices are designed to culminate in submissions to coordinate the state's outcomes on sustainable water usage strategies to government. Until recommendations are advanced for a range of agency water efficiency measures and technology solutions, agencies including EQ have no comprehensive approach or funding to address water saving targets. A number of school water review trials are currently being conducted through the GBWCP to determine saving solutions and costing effectiveness of the solutions.

Energy management

In conjunction with the Government Energy Management Unit, the Strategic Asset Maintenance Unit has developed a range of strategies aimed at the reduction of energy use by schools. EQ has approved the engagement of energy advisors on a cost neutral basis to conduct school reviews and implement savings strategies.

IT facilities (FMS)

Capturing and maintaining the utilities figures for all schools has been a priority of the Asset Management Unit. The visibility of these figures has enabled this FSB unit to quickly identify instances of excessive use of water and power and query the relevant school. Issues that have been identified such as excess water usage or unexpected/unwanted power usage have had methods documented and used to commence the eradication of this waste. Further use of the IT facilities could take this identification to another level by improving facilities as well as stopping waste.

The Facilities Asset Management System (FAMS) is currently being developed as a single point of truth system, which identifies a number of issues on the build state but is most comprehensive in capturing the previously disparate databases and linking them with current information. Instances are as follows:

- Linking the utilities information to the maintenance information of the school may indicate the reasons for resource use, for example, introducing or maintaining a pool may increase water use.

- A school where water usage was high with no obvious cause saw a review of pipes which detected leaks.
- Power increases can be linked to the introduction of airconditioning, but it can equally be explained where the introduction of joint use of facilities have been introduced such as after school hours usage.

These and more benefits are anticipated when the FAMS system data collection, training and implementation is complete in June 2006.

ESD briefing and ESD review in value-added reviews and project outcomes

The design guidelines identify the ESD elements of each project and what should be done for siting including the following:

- climatic assessment and building orientation
- site clearing (to preserve local character of the site and areas of natural vegetation of value)
- environmental management during construction (ensuring that the site is maintained adequately during and after construction)
- water management
- energy minimisation
- landscaping.

To this end, the introduction of value-added reviews into the construction process has established a review point for all of these elements and can now identify the crucial factors for introduction into the school built outcomes.

Cleaning

Cleaning processes and products in schools have been progressively improved in recent years to reduce the consumption of chemicals and consumable items. Benchmarking has occurred to identify best practice processes and consumption rates on a per cleaner basis, which have been integrated into procurement activities. Ongoing staff training has emphasised the need to adopt best practice, both in terms of chemical/consumable usage and maintaining high quality of cleaning for schools. These strategies have resulted in the cost of chemicals and consumables for school cleaning being reduced more than 30 per cent over the past four years.

School cleaning has also adopted a range of waterless cleaning practices, in terms of cleaning halls, amenities blocks and external pathways, which have been areas of high water consumption. This has been on the basis of the quality of cleaning being maintained or improved under these practices, which will be of benefit to the community in less use of chemicals and non-polluting outcomes.

Toilet build-ability

Strategic Asset Management Unit in conjunction with Project Services has recently completed a review of toilet build-ability that has culminated in new toilet design prototypes, alternative materials and construction methodologies, and a set of EQ cchool toilet/amenities design guidelines. These guidelines are to be integrated into the EQ Facilities design guidelines by mid 2006.

Solar schools

The Environmental Protection Agency (EPA) delivered the Solar Schools Program, now complete. The main emphasis of the program was to provide selected schools with a photovoltaic (PV) power system, ranging in size from two to five kilowatts. PV power systems are co-generational and are mounted on north-facing roofs only. The system has input from the panels to the inverter and then onto the grid. The grid is monitored through a computer interface, which services the same need as a meter.

Seventy-seven Queensland State Schools and seven non-state schools have had a PV power system installed under the program, which concluded in September 2005, with no definite plans to extend. The program was supported by the Queensland Government's Green Energy Purchase contract and funded and administered by EPA.

Schools in the program have benefited from reduced energy consumption costs of approximately $500 per annum per school. Electricity retailers have identified significant interest and increased usage by subscribers of green power products in communities where the Solar Schools Program has occurred. The Queensland Environmentally Sustainable Schools Initiative (QESSI) Strategic Plan recognised that the Solar Schools Program was a valuable partnership with EPA to meet the strategy of 'Improving school resource management, including water, waste, energy, transport and school grounds'.

Ergon Energy has been a key stakeholder of the Solar School Program since inception. Ergon Energy has recently invited local sponsors to extend the Solar Schools Program to a maximum of 18 regional schools by 2006–2007 in consultation with EQ.

Landscaping design

Consultants were engaged to research and produce landscaping design guidelines which will supplement the EQ design guidelines. Interim guidelines are expected to be published by mid 2006, to assist design teams in landscaping for the planning and delivery of new projects. A school landscaping management publication will also be published to provide ready advice to existing schools that decide to upgrade their existing landscaping and grounds.

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