

**Conference Paper Final**  
**IREE 2017 Conference**  
**Improving Residential Energy Efficiency is now a Global Challenge**  
**University of Wollongong 16-17 February 2017**

**Category**

*“Market Failure - What needs to be fixed to improve residential energy efficiency?”*

**Introduction (Tony)**

*What!... you may ask has NSW TAFE got to do with Market Failure and Energy Efficiency?*

The answer from an education perspective is simple but the problem is complex, the big picture issue comes from our misunderstanding and often misuse of the principles of “Sustainability”. .....Not fully understood and generally not implemented to its full meaning. ....Often it gets labelled as some ‘greenie fringe’ element and quickly dismissed when an ill-informed and economic bottom line approach is taken.

Let’s look at the background of this issue to see why this is happening.

A well-known Environmental Scientist from the UK by the name of Tim O’Riordan once stated, we have three main challenges in implementing true sustainability and making the paradigm shift needed.

We have:

**1. Wicked Problems:**

Contradictory and changing requirements and effective solutions are difficult to realise due to complex independencies across a range of factors.

**2. Uncomfortable knowledge**

New and emerging knowledge that challenges our current beliefs and behaviours.

**3. Clumsy Solutions:**

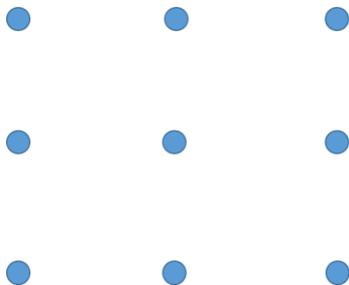
The trend to apply conventional solutions to unconventional problems. Trying to solve ‘wicked problems’ with traditional approaches.

In other words, we need to *think differently about how to solve these wicked problems.*

Albert Einstein was quoted in saying the same thing but in different terms ....”*You can’t change something with the same consciousness that created it*”..... What

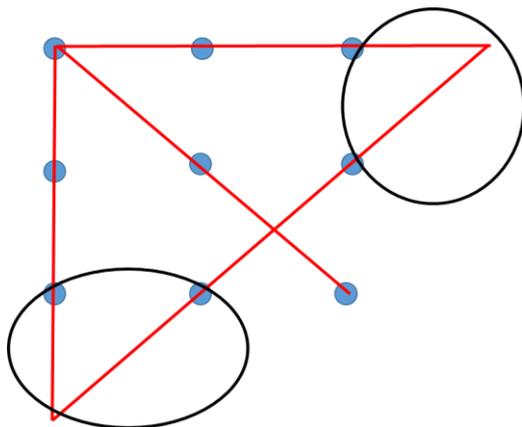
they are both saying is that we need to think outside the square, break the mould, be innovative and proactive....easier said than done.

Now just to see if you feeling sharp today. , ..... see this diagram of 9 Dots on this presentation slide.



What I would like you to do is to connect all 9 Dots using only 4 straight lines without taking your pen off the paper?

**(Give them about 2-3 minutes)**



We need to think outside the square,....., we are programmed to think inside the square, within design briefs, job descriptions, contracts, approvals, curriculums etc

To be creative or innovative means in some cases is to risk being a failure,..... a chance not many systems particularly the education system will be comfortable in contemplating!

Generally speaking, we have less than courageous governments,.... relatively low energy costs and a community that has increasing interest in good building design but has yet to translate into market demand and an energy industry that has a poor marketability.

The issue is how to achieve real change on the ground in an industry that at one extreme does not even realise there is a problem and at the other has uncertainty about the risk to making a change.

Skills and training is an important part of the development of the renewable energy sector,..... in the 1970s, the first oil shock, triggered interest in the renewable energy market,..... but poor quality renewable energy systems and lack of appropriate policies and market management stunted the growth of the this sector and affected its credibility.

Better marketing to the wider population in order to build market demand is needed to drive the policy and market changes that are needed in order for the renewable energy sector to have the opportunity to prove its worth.

Marketing is about promoting a concept or product that will fulfil the needs for the future,..... the same for what the theory of sustainability is about..... but how many of us can predict what the future will look like in 5 years' time?

This creates a problem for educational organisations like TAFE NSW and the University of Wollongong for that matter, particularly in the rapidly changing arena of energy production, usage and efficiency.

This is because it's difficult to develop curriculum and provide knowledge and training when the market is yet to mature..... even though it's obvious that this is the very knowledge and training that the workforce needs in order for industry to have sustainable commercial buildings and consumers have reasonably priced energy efficient housing.

Also things to avoid..... is what happened in Victoria where there were too many TAFEs competing to service a thin labour market which locked renewable energy courses into a cycle of low student numbers that meant low levels of resourcing and it struggled to survive and consequently also affected their credibility.

Therefore, how can a training organisation like TAFE have a positive influence on the energy efficiency market and the concept of sustainability and be thinking outside the square when doing it?

The paradox is that TAFE's mandate is to deliver training that industry requires and at the same time be a leader in innovation and support change.

For the main part, industry is focussed, through necessity on the immediate to short term future as innovation means risk, investment, failure and learning takes time. TAFE trains its students to high standard, in a crowded curriculum, in construction techniques, project management, safety and legal requirements.

The current National Training Packages focuses on training for the status quo and have some way yet to go to be future focused in respect of sustainability and innovation..... The reason for this is that TAFE delivers the training required by industry and if industry does not choose sustainability units from the national training packages for a trade qualification then it's generally not delivered.

In the VET system as a whole, issues such as sustainability, problem solving, innovation and entrepreneurialism are knowledge based issues.

The competency based system doesn't cope well with knowledge based learning as its very basis is founded on the premise that students must be 'trained to demonstrate competence' rather than educated 'to be able to develop competence'.

Therefore competency based training on its own won't deliver that which a skilled workforce requires:

- ✓ thinking outside the square
- ✓ problem solving
- ✓ innovation and
- ✓ product and service development
- ✓ entrepreneurialism

Sustainability is not a new concept, in 2005 the United Nations Decade of Education for Sustainable Development was launched and this emphasised the role of experiential learning and advocated that sustainability be embedded in curriculum at all levels of education.

A well-respected educator in the UK, Sir Ken Robinson was quoted in saying during a TED talk on the subject of education said "*The role of education is to take people into the future that we can't even grasp*", In this context the limitations of competency based training are clearly apparent.

TAFE aspires to be the leader in vocational education and training and therefore must itself be continually upskilling to deliver the education and training needed to influence and support real on the ground change.

Back to the Market:.....The old saying is ..... 'demand drives supply'. The market dictates what training is delivered and what skills are seen necessary to supply the market.

I once had a conversation with a high profile 'Project Home Builder' and we were discussing this issue of what the market wants, he said he sees a place for sustainability and good environmental outcomes like an energy efficient houses, solar orientation etc. but the public are just not interested or not willing to pay the extra upfront. I replied,..... "*One issue is that the public aren't being exposed to these design concepts either,..... you're not building these type of houses in your display villages..... just more of the same with no chance for the market to see or experience anything else*".

I contacted another well know project home builder after they had finished building 3 energy efficient homes on contract for Lancom..... I naively asked them how had this experience changed the awareness level of their trades and range of products they now offered?.....the answer I got back was nothing has changed and I

quote,..... “we just built those homes because we won the contract!” .....So, no learning outcomes there!!!

Energy efficiency technologies have suffered from policy inaction, confusion and constant inconsistent changes.

There has been a stop start market demand and in some instances where customers are given the wrong advice or had the incorrect technology installed to suit their purpose has led to mistrust in the technologies and diminished their competitiveness and/or reputation in the market place.

Therefore there is need for high quality ‘trusted’ information, stable policy settings which will provide us with the opportunity to provide practical and flexible approach to the training of architects, engineers, technicians, builders, plumbers, electricians, painters and retailers and not forgetting the customers or end users as well.

Skill demand is substantively developed by public policy and government reaction to circumstances with classic examples being the increased demand for solar panels back in Solar Rebate years and the requirements that electricians needed specialised training in installation, connection and disconnection of solar systems with a relatively exorbitant system of licencing required.

And at the other end of the spectrum was the rushed implementation of the home installation initiative that lead to inexperienced and poorly trained installers bringing the whole initiative to a tragic end.

The demand from industry has also been affected by the lack of direction from successive governments where companies have been reluctant to invest in new technologies and up skill their existing workers or employ more workers with no certainty of future work.

We can’t forget the need to include the supply chain in any major paradigm shift. .... The links in the chain from design to installation to maintenance must be included in the process of raising the level of awareness to ensure the changes are embedded and succeed.

The challenge is to ensure not only that the environmental benefits are realised but also the economic value and societal effects such as jobs and business viability and profitability are realised.

I would now like to hand over to Mr Marty Burgess Faculty Director Trades and Technology to talk more about in more detail on TAFE’s response to these issues and how TAFE can influence the market and be thinking outside the square.

## **Marty**

*How can organisations like TAFE NSW foster positive change raise a new level of awareness regarding sustainability?*

*How can TAFE NSW take meaningful action to create innovation and facilitate continual improvement in sustainability?*

*How does TAFE NSW fulfil its responsibility as the premier public educator and translate these ideas into education and training that can influence the market?*

One of the ways that TAFE NSW has been working to achieve this is the implementation of a “Building the Future” strategy, where we have:

- held a number of workshops with all our Trades and Technology Head Teachers and key staff on ways to implement the concept of Sustainability into the day to day delivery of mainstream courses and skill sets,

The objective is to expand on the concept of Sustainability not just from the environmental point of view but from the Triple Bottom line approach which is a simple but effective way of showing how sustainability is also about people and the bottom line in a practical way.

Another solution is the new model for TAFE NSW, which can be simply described as ‘One TAFE’. This model will harness the best of TAFE capability across NSW and direct resources to where its required to build the skilled workforce and support businesses to be innovative.

Also the importance of the creating strong links and collaborations with key influential players in the industry and community needs to be recognised. One good example is the close links between TAFE NSW and the University of Wollongong have formed in particular the partnership we have with Sustainable Research Building Centre headed by Professor Paul Cooper.

This close collaborative partnership with the University of Wollongong can help raise the level of awareness and facilitate change as both TAFE NSW and UOW are community owned educational institutions with international reputations for quality research, education and training but moreover both are dedicated to supporting and improving the communities and business they serve. . .

The TAFE – UOW partnership has developed projects such as the winning entry in the student lead World Solar Decathlon Challenge 2013 held in Datong China and our current collaboration in the next World Solar Decathlon Challenge in 2018 which we are now currently working on.

The TAFE NSW UOW relationship is a good example of the public value that can be developed when “Theory meets the Practice”.

Professor Paul Cooper and I have built this partnership, as we believe that there is a parity of esteem between TAFE NSW and the UOW due to the respect each institution has for the other's expertise and commitment to sustainable technologies. Put another way we both understand that no matter what the innovation science or engineering is developing, testing and monitoring for a new form of technology, you still need the TAFE NSW trained paraprofessionals and 'tradies' to understand, install and maintain it.

To overcome this issue of an ever-changing policy and technological landscape, TAFE NSW in conjunction with the University of Wollongong's SBRC businesses and industry innovators, is developing a suite of continual Professional Development Programs on the latest technologies.

The need to include the whole of the supply chain is an imperative. There are some wonderful examples of innovative practices and technologies now available and TAFE NSW will continue to embed these in our training and share these ideas via Continual Professional Development workshops to include all parties in the supply chain so that everyone has the opportunity to improve their position in the market place.

The other issue in market influence is the cost benefit of any innovation.

One way TAFE NSW has sought to influence the supply chain has been by building in partnership with UOW the previously mentioned Solar Decathlon house. We didn't start out to build an iconic house which would be out of reach for the market to adopt. We built a house which was based on retrofitting an existing 1950's house. The reason being that we wanted to demonstrate the buildability of this new concept house. We wanted to make the iconic 'ordinary'.

To influence the marketplace TAFE NSW held a 'trade night' at the Wollongong. The comments by many of the building industry representatives who attended a trade night held at the TAFE Wollongong Campus, where the house was built, was the general agreement that the innovative techniques used to upgrade the house and make it more energy efficient were a good idea but *who was going to be able to afford this and What is its marketability?*

Here again the collaboration with the SBRC is important. One of the outcomes of the Low Income Energy Efficient Program (LIEEP) that is subject to a number of Papers here at this Conference is the need to have *real time hard data on cost benefit of the installation and maintenance of the retrofits on a house*, in this case for the elderly.

The theme for the next solar decathlon house has its origins here as our focus this time is to build a house for people who have dementia.

In any one of the Continuing Professional Development programs we will ensure that Cost Benefit is included or is a factor in the workshops to make them more real and marketable.

Another innovation that TAFE NSW has developed is in the area of 3D modelling, we have just completed our first cohort of students in a 12 month Building Information Modelling (BIM) course and this year have made it available on line via a Moodle platform to then progress to interstate and international access to this amazing software and its capabilities.

We can now imagine a time when the trades people will walk onto a building site with a tablet computer instead of reams of hard copy plans and have access to a 'cloud based' 3D fully integrated real time plan of the project that helps to overcome the massive waste of time and money on amendments, clash detections, project time line conflicts, immediate cost implications of any changes, immediate energy modelling etc. and thus used as a sustainability tool to help alleviate the sometimes very wasteful practices that occur on many building and construction sites all over Australia.

We know that designing residential and commercial buildings save at least 10% on building costs and 20% costs over the life of the building.

We need our students to graduate from our courses with a greater understanding of what is possible not just what we are doing now but train them for the future just not the present.

We have the successful case studies and examples of best practice such as the University's Sustainable Buildings Research Centre at the UOW Innovation Campus and TAFE's Transformational Technical Training facility at its Yallah Campus as teaching tools in their own right, clear on the ground examples of what can be built and sustainably occupied.

And finally to draw a conclusion on the question "*Market Failure - What needs to be fixed to improve residential energy efficiency?*"

The answer is all about education and awareness, to clearly demonstrate that sustainability is just not a concept but a day to day way of working to ensure the way we live our lives will meet the needs of the current generation without compromising the ability of future generations to meet their own needs and thus drive a market to be more socially responsible which includes energy efficiency in the way we use and occupy our buildings.

What we want to do is expose our students to the latest technologies and systems but also give them the tools and desire to explore 'outside the square' for themselves.

We believe it is incumbent on us, the educators, to play a role in raising the level of awareness in our students and their ability and desire to research and develop different ways of doing things, we want them to use different materials, explore concepts such solar design, modular construction, phase change materials and other energy storage systems, 3D modelling, tri-generation technologies and above all to

stop the process of educating them out of their creativity, not just doing more of the same but be open to new ideas, be given the tools to achieve this via their education and training but also to realise that can you make a living this way,..... truly, sustainability in action.

Thank you.