

Sustainable energy planning: case study, Parkes Shire Council

THINK.
CHANGE.
DO

Local Environment Management Short Course

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Introduction

- Institute for Sustainable Futures (ISF) is a research institute at University of Technology Sydney, set up in 1997

“to create change towards a sustainable future through independent, project-based research”

- Work extensively with all levels of Government, industry, and communities, with a focus on empowering stakeholders

This talk

- Some ISF work with Local Government
- Distributed energy: WHAT is it, WHY should we bother, and WHO can benefit?
- The Parkes Distributed Energy Plan project

ISF works with Local Government to..

- Better understand approaches to sustainability
 - Research on drivers and barriers (Urban Sustainability Support Alliance)
 - Research on environmental & sustainability education (8 NSW councils)
- Develop sustainability indicators or corporate planning, eg
 - Community indicator framework, City of Sydney
 - Corporate Sustainability Strategy, Adelaide City Council
- Improve waste minimisation and resource recovery, eg
 - Waste exchange tool for Auburn and Parramatta City Councils
 - Review of recycling materials for Kogarah Council
- Reduce potable water use
 - De-centralised Water Master Plan for City of Sydney
- Mitigate climate change and improve climate change adaptation
 - Community engagement and barriers to adaptation
 - Parkes Distributed Energy Plan

Community engagement on climate change adaptation (7 Vic Councils)

Three pilot programs

- #1: The 'Brains Trust'
- #2: Grassroots community leadership
- #3: Mobile outreach activities



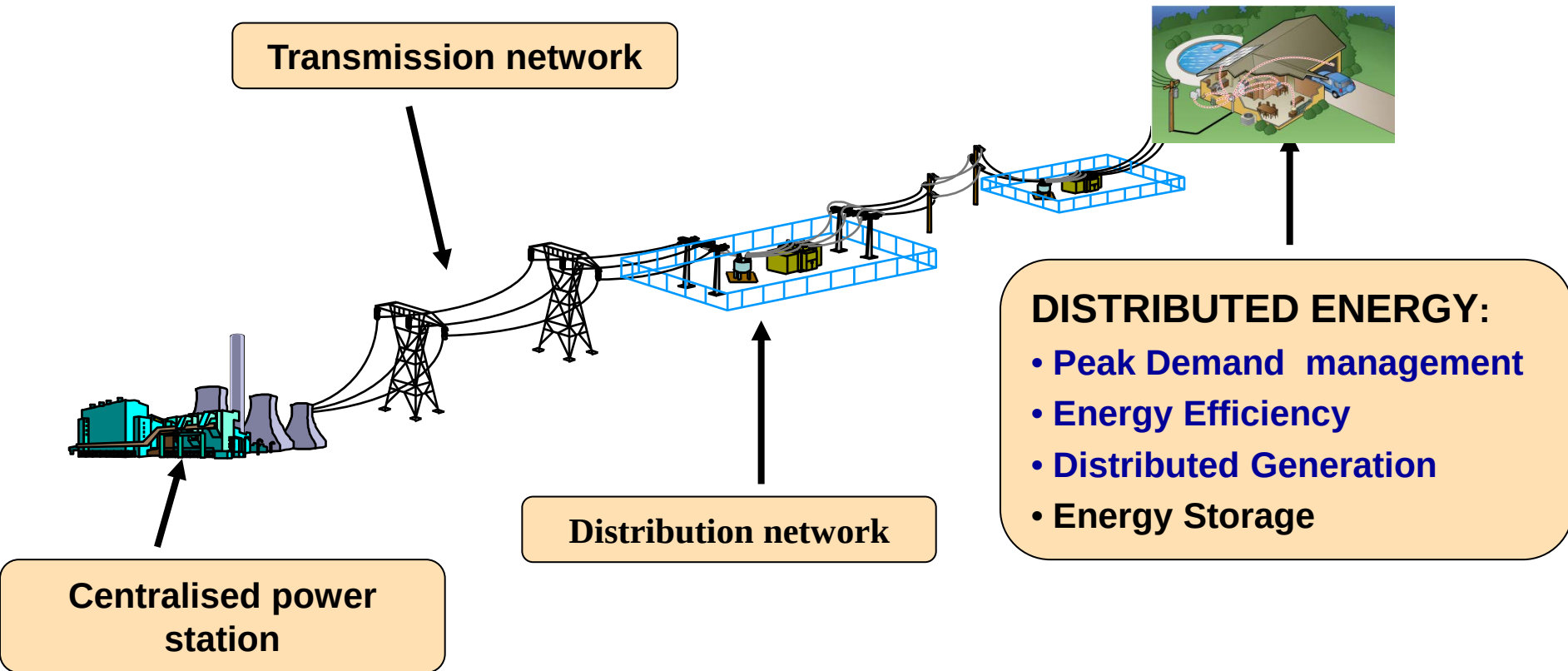
Community leadership – Harrietville
Community Building Initiative



Mobile outreach - resilience
pledges at Wangaratta

Details on projects available at
www.isf.uts.edu.au

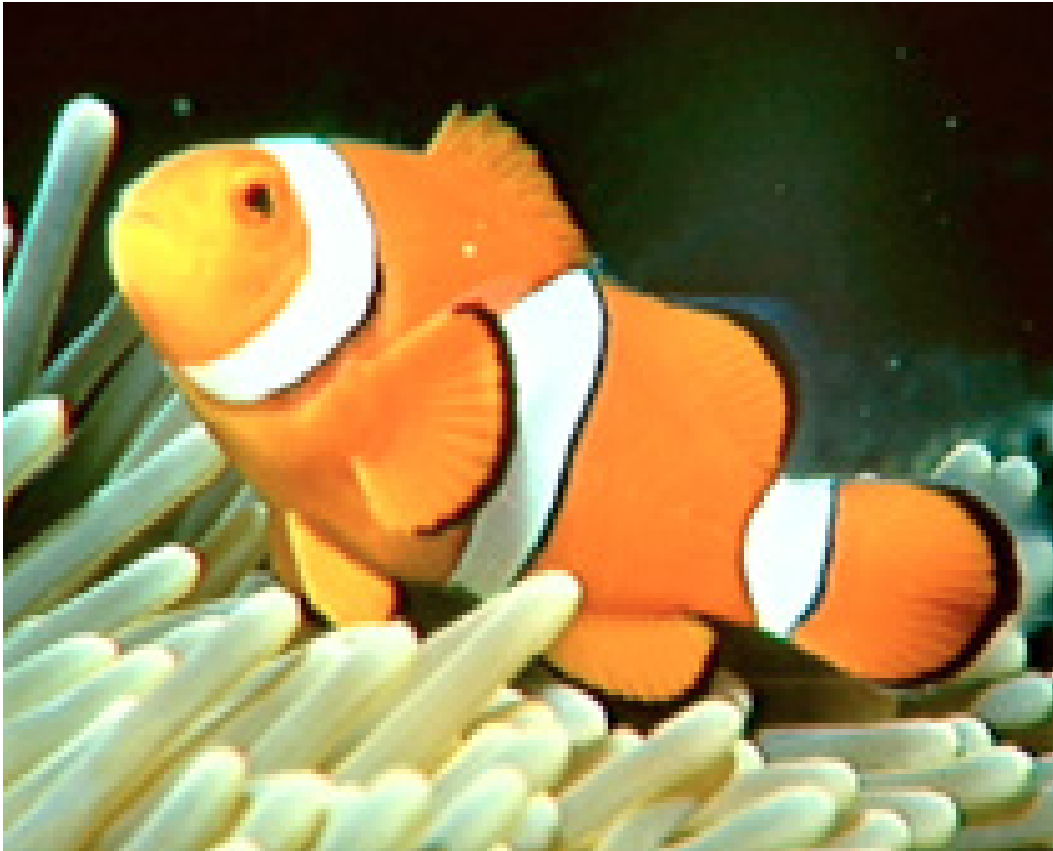
What is distributed energy?



Climate change

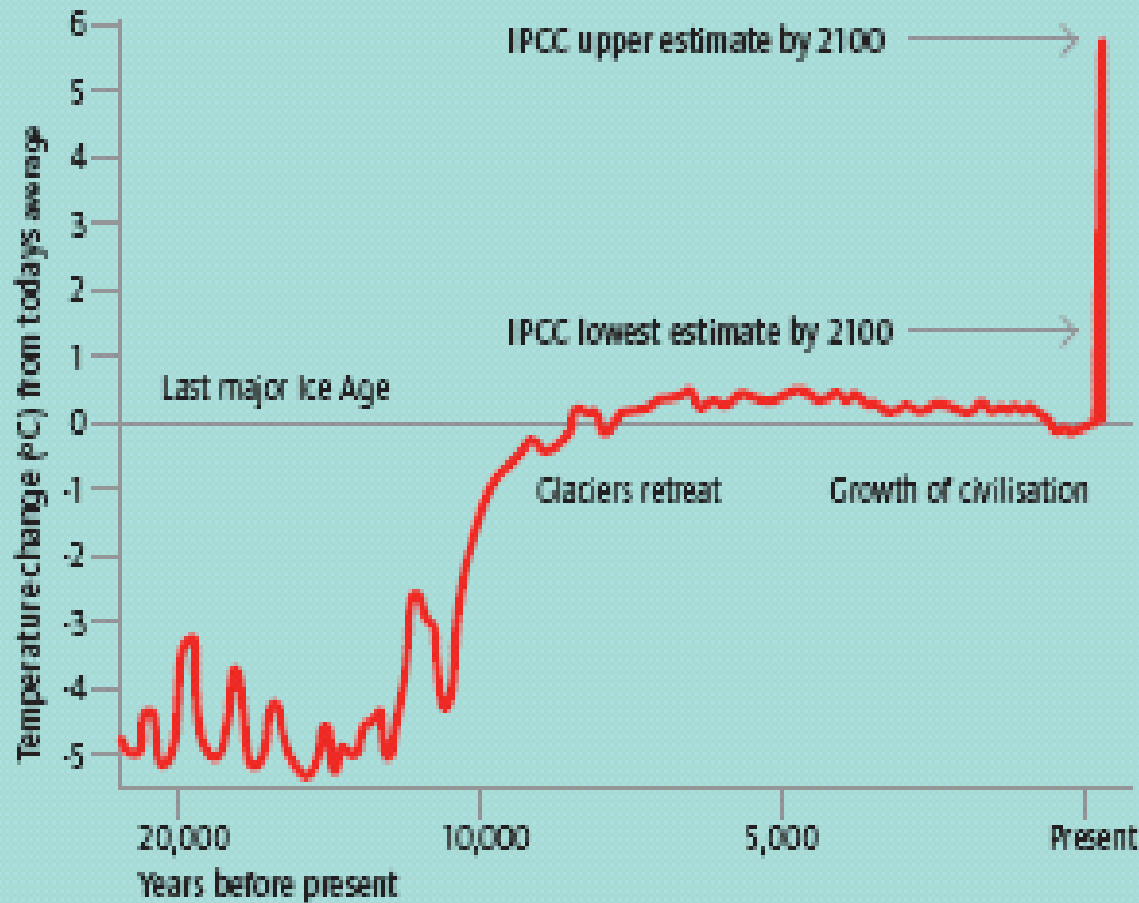


Climate change



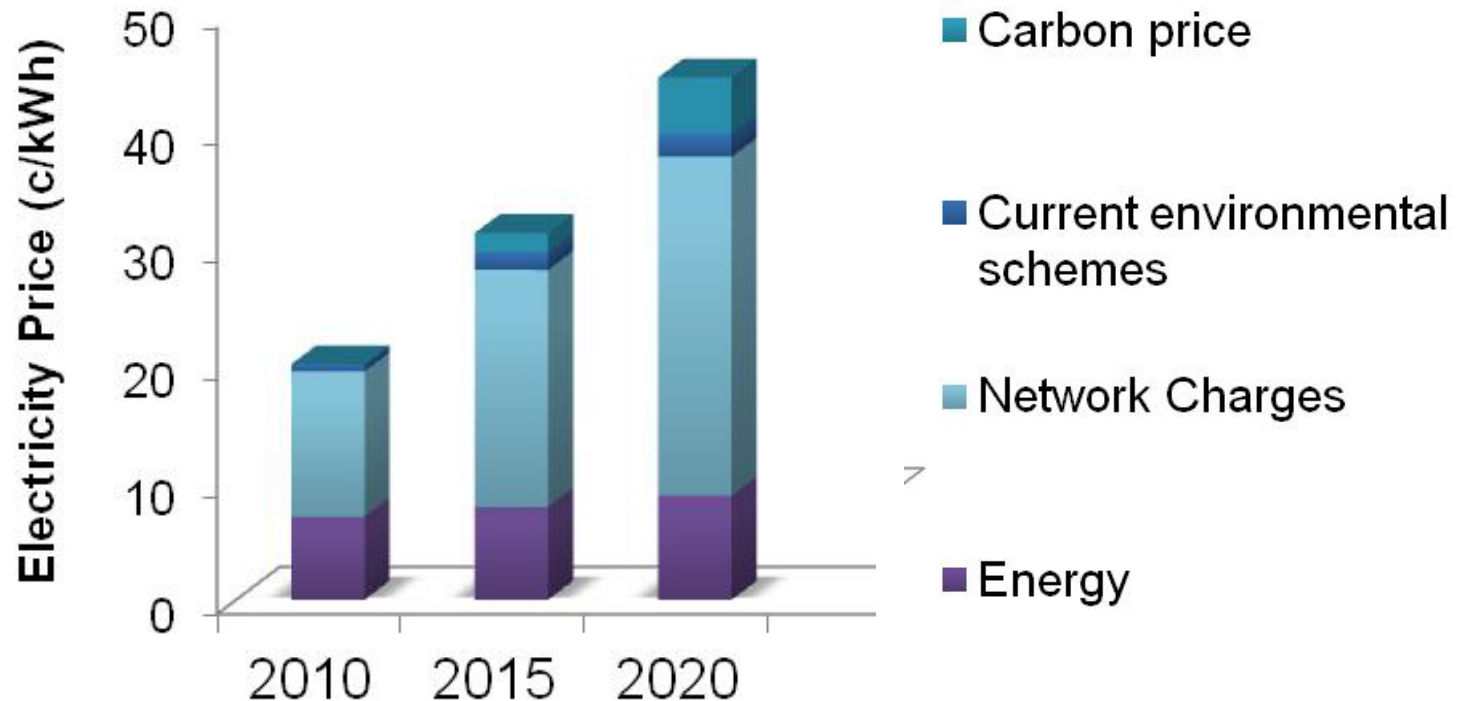
Climate change

Global temperatures over the last 20,000 years²



Global temp
2° to 6°C hotter
by 2100
(5°C cooler was
the last major ice
age)

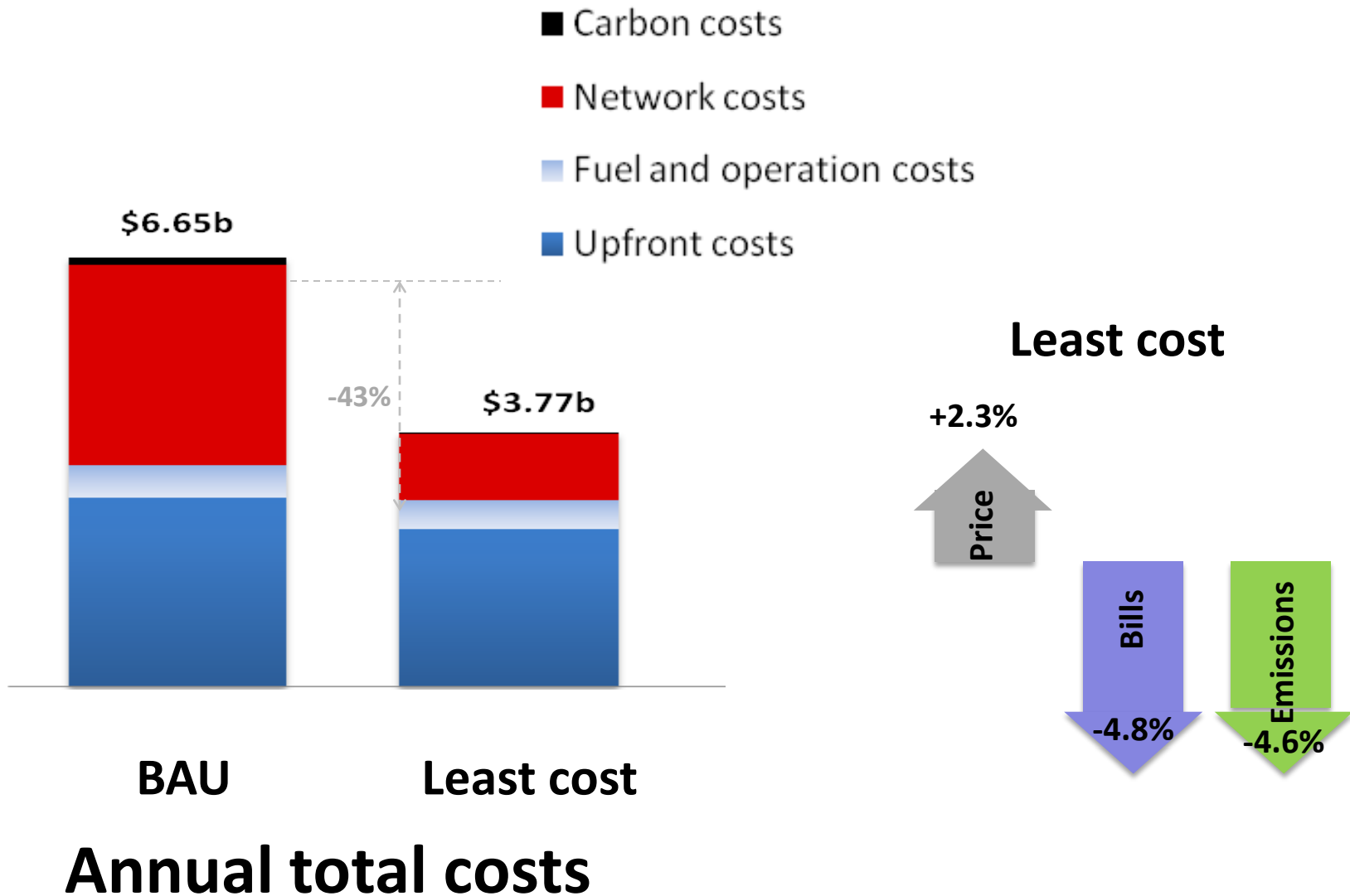
Why bother? – energy prices



Electricity prices double by 2020

Gas prices increase 50% by 2020 (more uncertain)

ISF modeling: energy costs for Australia to 2020



Who can benefit?

- Councils (own energy needs)
- Local businesses with large energy use
- Community/council partnerships



**Jühnde, Germany's first
bioenergy village**
(owned by co-operative,
75% local membership)

Community renewable energy

- Installation on community facility
- Council arranges bulk purchases of PV
- Renewable energy co-operative e.g. Hepburn Wind
- Renewable energy developer/ community partnerships



**Bro Dyfi community
wind turbine, Wales**



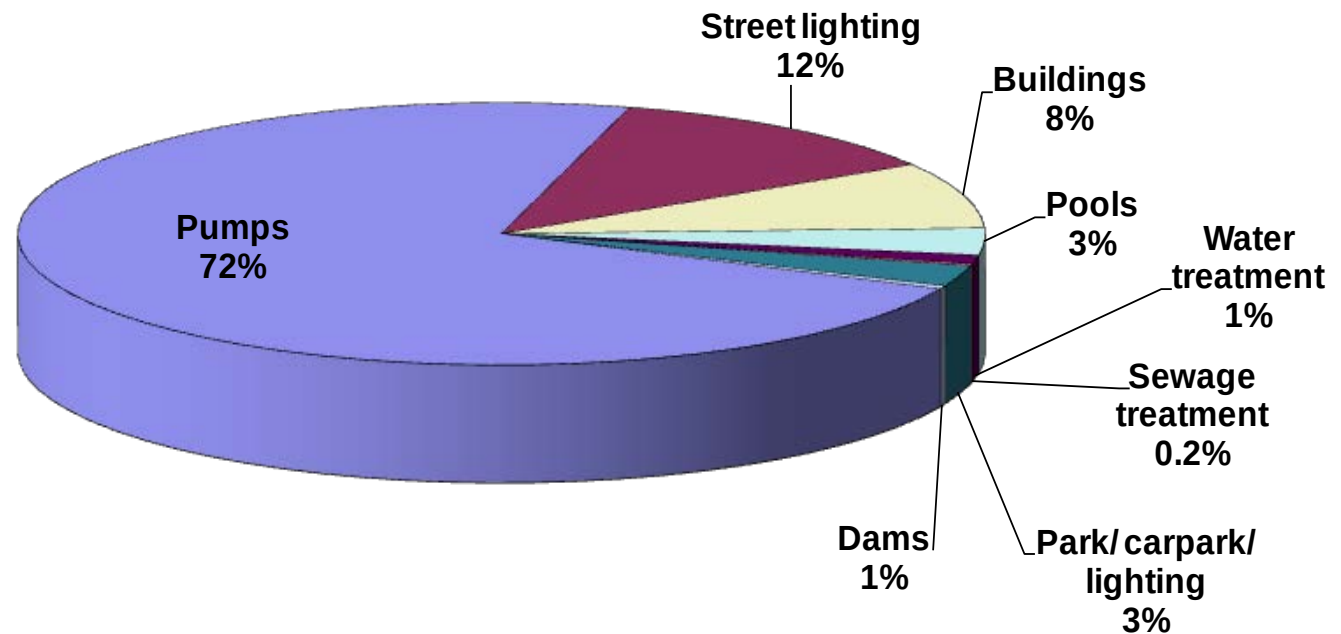
**Solar Farm near
Flensburg, Germany**
(community investment)

Parkes Shire Council project: the process

- PSC requested tenders for Sustainable Energy and Water Plan
- Prepared situation analysis and high level options assessment
- Stakeholder workshop to choose options for business case
- Developed business case tool
- Presented results as draft DE plan
- PSC adopted recommendations

Parkees Council - energy costs

Parkees Shire Council
Total \$1.3 million per year
now ~ **\$2.6 million by 2020**



Options analysis: efficiency

- Buildings efficiency → **PSC will pursue anyway**
- Demand side response ✓ **in business case**
- Pool heating ✓ **in business case**

- Water pumps → **Already done major EE**
- Leak control → **PSC will pursue anyway**

Options analysis – energy supply

Parkes Shire Council

Renewable energy options

- Wind energy
- Solar PV
- Solar thermal generation
- Bioenergy

✓ in business case

✓ in business case

✓ in business case

X uneconomic

Co-generation/ trigeneration

X uneconomic

Gas engines for pumps

✓ in business case

Needs resource assessment for each area

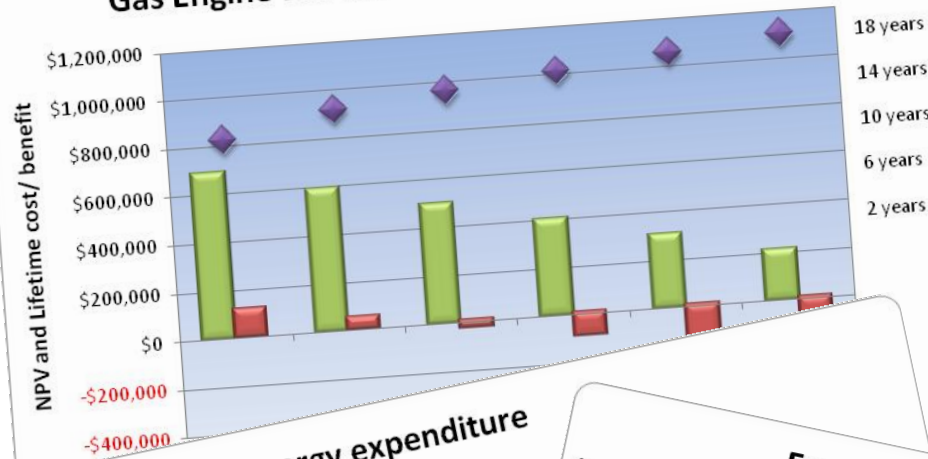
Stakeholder workshop

- Presented current situation and high level option overview
- Examined risks and benefits (council staff, councillors, community members)
- Selected 6 options to take forward to business case

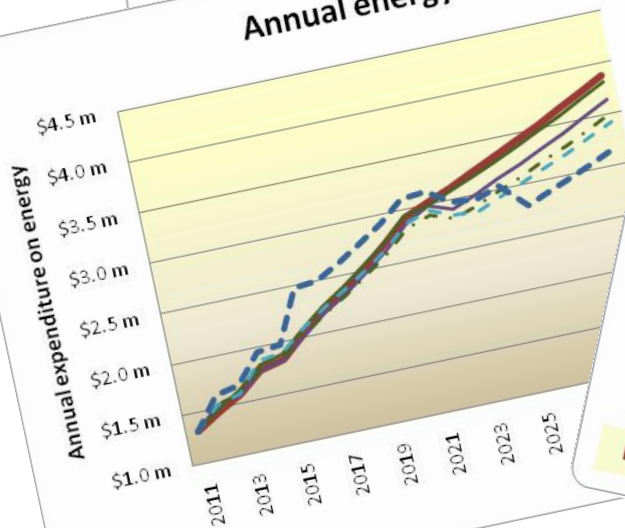
Solar pool heating, Demand side response, solar PV, wind, gas engines, concentrating solar thermal (CST)

Why a business case model?

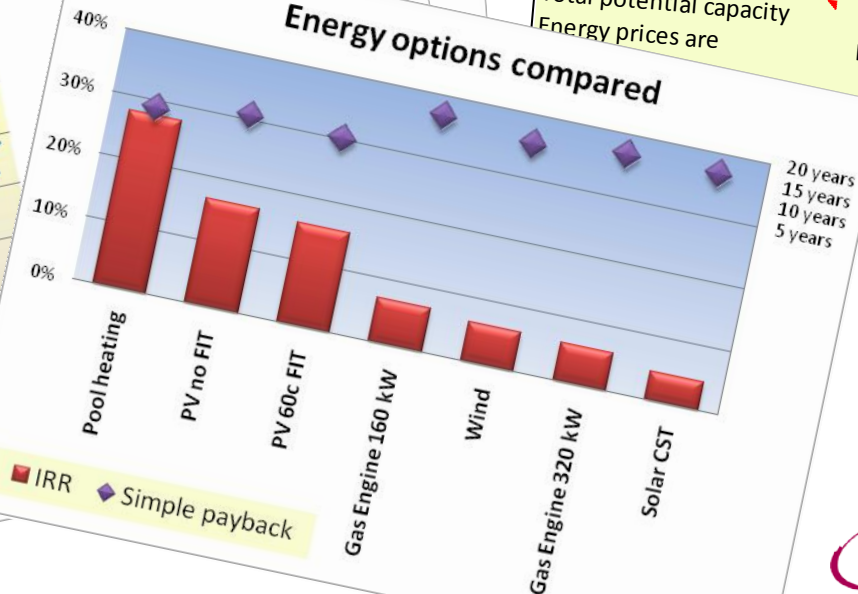
Gas Engine 160 kW (160kW); Capital cost \$279k



Annual energy expenditure



Energy options compared



INPUTS

Technology
Size of system
Capital per KW
Capacity factor

Wind

100 kW

\$7,000

26%

Year of installation
Delay before generation
Repayment period
Lifetime
Deterioration over lifetime

2014

0.5 years

10 years

25 years

0%

TARIFF

Energy price projection

LOW

MEDIUM

Total potential capacity
Energy prices are

100 kW

NOMINAL



Institute for
Sustainable
Futures

The business case model

- 25 year cash flow (capital & interest repayments, energy savings, other costs)
- Individual options and effect on overall energy cost/ emissions
- Shows range of financial indicators
 - the internal rate of return (IRR)
 - simple payback
 - lifetime benefit
 - Nett Present Value (NPV)

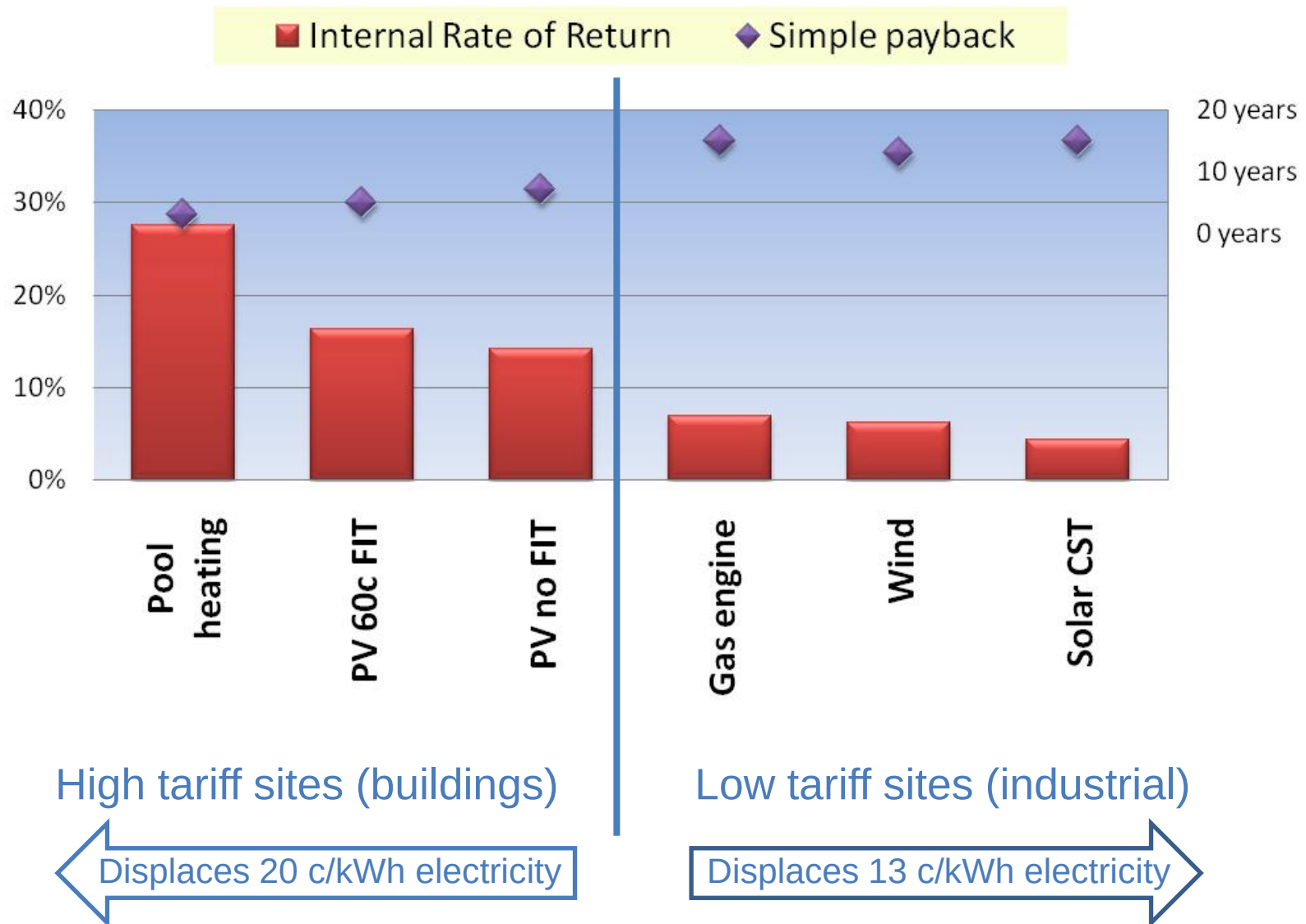
What the user can easily vary

- Interest rate
- Loan repayment period
- Which electricity tariff applies
- What year the technology is installed
- Capital cost (“what if”)
- Include/ exclude DSR, number of hours, and payment per MWh
- Real or nominal dollars

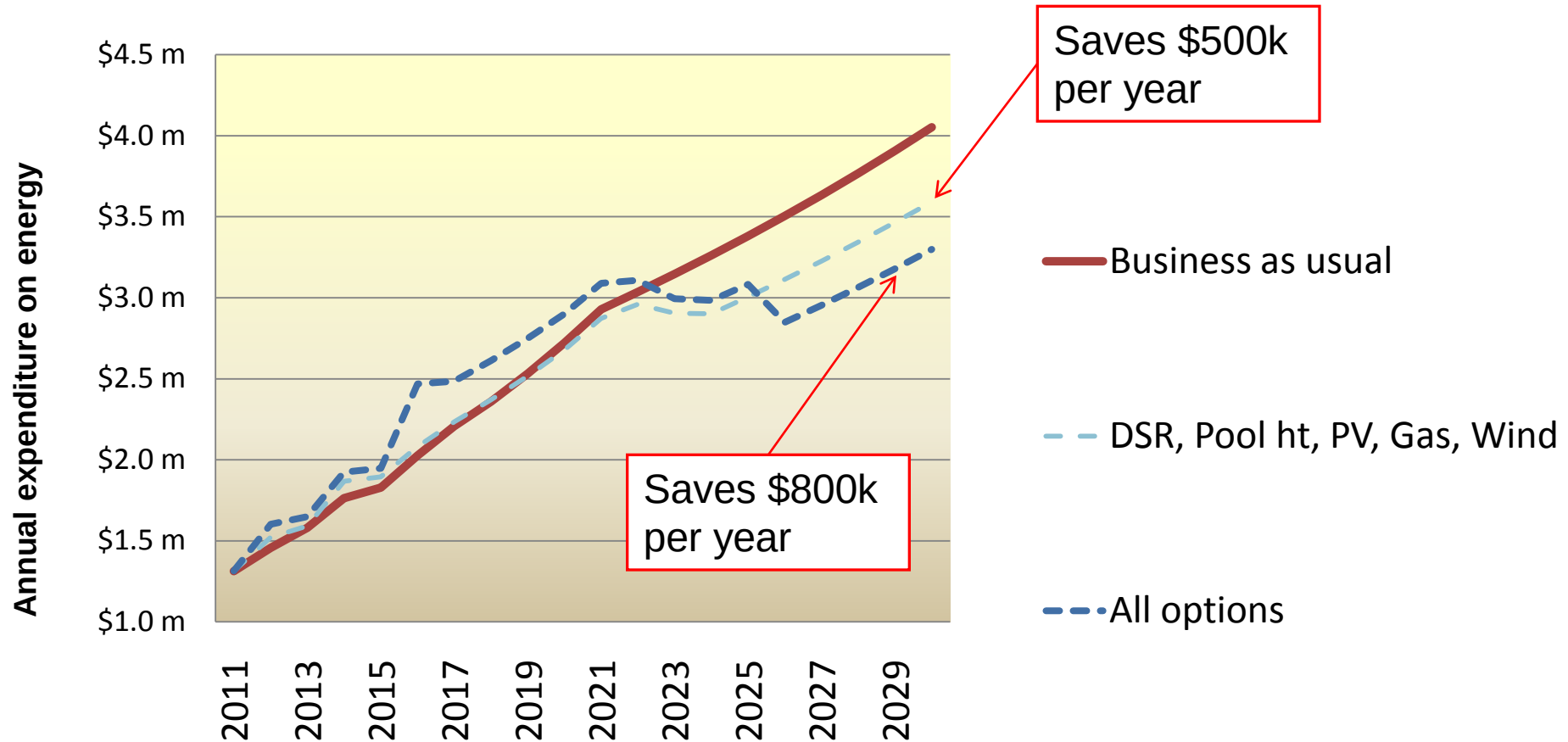
What ISF sets

- Potential for each option (i.e. scale)
 - Energy price projections for each tariff
 - Demand Management payments, fuel price
-
- Default levels for maintenance cost,
 - Subsidies available for renewable energy

Parkes DE business case: overview



Sample model output – energy spending



Distributed Energy Plan

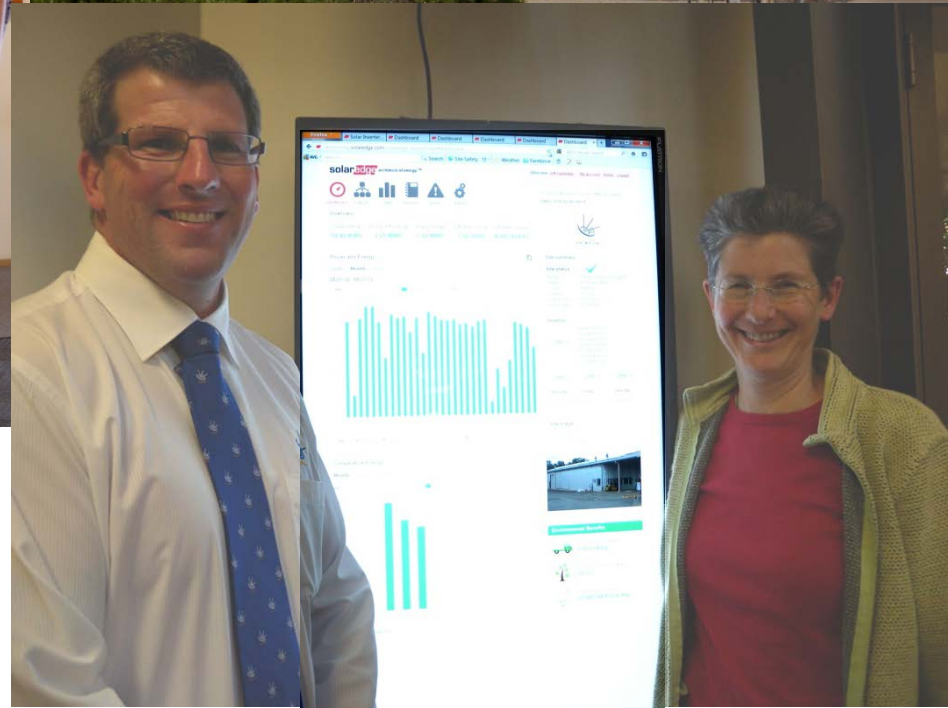
1. Implement program of leak control ✓✓
2. Implement program of building energy efficiency ✓✓
3. Obtain quotes & implement solar pool heating ✓
4. Start negotiations for a Demand Side Response scheme ✓
5. Install 10 kW PV systems (60 cent FIT site) ✓✓
6. Install 290 kW PV on buildings provided suitable prices are obtained. ✓✓

Distributed Energy Plan (2)

7. Install public display for installed Distributed Energy. ✓✓
8. Initiate discussions with Essential Energy about putting generation against off site electricity consumption. ✓
9. Install 150 kW gas engine at High Street pump site, conditional on better information.
10. Install 100 kW wind at Back Yamma Pump site, depending on the outcome of wind monitoring, capital cost, and annual output. ✓
11. Install solar CST at the Water Factory site, dependent on costing and availability of suitable technology.

Parkes Sustainability Day – opening

209 kW of PV



Outcomes for the Council

ACTION	Water savings	Annual CO ₂ savings (tonnes)	Economic savings (lifetime)	Average annual savings (net)	Simple payback
ALREADY IMPLEMENTED					
Leak control	66 ML	26	\$0.15 million	\$10,500	1 years
20 kW of Solar PV		31	\$0.2 million	\$10,000	3 years
190 kW Solar PV.		295	\$1.9 million	\$76,000	7 years
SUB-TOTAL		352	\$2.6 million	\$142,100	
IN PROCESS					
Building efficiency (lights)		214	\$1 million	\$69,000	2 years
Solar pool heating		46	\$0.4 million	\$17,400	2 years
Pump efficiency		540	\$3 million	\$204,000	1 year
OVERALL TOTAL		1152	\$6.7 million	\$384,600	2 years

Capital cost of all measures \$1.7 million

Outcomes for the Community

- Better value for Council spending
- Council showing leadership on energy and climate change
- Council launched bulk buy scheme for PV on their Sustainability Day so community can access the same savings
- ISF would very much like to repeat the work with other Councils

Questions???

More details on projects available
www.isf.uts.edu.au