A clear understanding of policy goals, mechanisms, and impacts requires a clear understanding of the sign of key changes.

Focusing on what goes up \{+\}\ and what goes down \{-\}\ would do wonders for public debate.

Outline:
- abatement task and tools
- things that go up or down
- why this is important

SIGNS \{+/-\} & WONDERS
in Australian carbon pricing and climate policy

Steve Hatfield-Dodds
CSIRO Energy Transformed Flagship and
Centre for Climate Economics and policy, ANU
EEN Symposium, Canberra, November 2010
Emissions and National Abatement to 2020

Sources: data from Department of Climate Change and Energy Efficiency (DCCEE), 2011, Australia’s emissions projections 2010 (December 2010, released February 2011), DCCEE/Commonwealth of Australia, Canberra. Figure 5

Abatement Tasks and Tools

Abatement Challenge in 2020 (Mt CO2e)

-5%
-15%
-25%
+24%

Historical emissions
Baseline national emissions, no carbon price or other new policies

Emmissions excluding land use change

Emisisons excluding land use change

Illustrative domestic emissions, influenced by carbon price

Illustrative national emissions trajectories, determined by emissions target

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Signs \{+\text{-}\} and wonders

**national emissions fall**

- Emissions allowances fall 60-90\% from 2000 levels by 2050.
- Domestic emissions typically fall slowly to around 2030, and then accelerate, with trend rate depending on the carbon price.

**... but national incomes rise**

- Average income grows around 1.3\% per annum in most scenarios, compared to 1.4\% pa in the reference case.
- Real GNP per capita rises from $50,400 in 2008 to at least $54,700 in 2020 and $78,000 in 2050.

Source: Australian Government (2008) Australia’s Low Pollution Future, Charts 6.1 and 6.4 (not shown); Summary Table 3.2.

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**Signs \{+\text{-}\} and wonders**

**real energy prices rise**

- High, moderate and low carbon price ranges are $15-50, $30-75 and $45-100 over 2010 to 2030.

**... but affordability improves**

- (as energy prices rise less than incomes).

Affordability is defined as the share of income required to purchase average 2005 energy bundle, given projected changes prices and incomes. (Chart is for $30-75/CO_2e carbon price, 2010-2030.)


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Signs {+/-} and wonders

<table>
<thead>
<tr>
<th>Mechanisms and policy indicators</th>
<th>Outcomes normal people care about</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbon price</td>
<td>average income</td>
</tr>
<tr>
<td>national abatement</td>
<td>employment</td>
</tr>
<tr>
<td>energy prices</td>
<td>energy efficiency</td>
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<tr>
<td>income taxes</td>
<td>domestic emissions</td>
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<tr>
<td>and incentives to work</td>
<td>energy affordability</td>
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<tr>
<td>emissions intensity of energy</td>
<td>national affordability</td>
</tr>
<tr>
<td>investment risk</td>
<td>domestic emissions per person</td>
</tr>
</tbody>
</table>

what goes up

 {...and things that depend on policy detail and global trends}

what goes down

... and things that depend on policy detail and global trends

Why clarity on the sign of change matters #1

- Policy impacts are frequently described as a ‘cost’ or fall in income (or GDP, employment, etc)
  - risks a reference point error, mistaking impact [A] for [C]
    - likely linked to conflation of emissions and energy use, and centrality of energy to ‘modern’ life and lifestyles
  - triggers loss aversion, which effects real world choices and likely policy preferences
  - draws attention to role of information on change in income relative to today [B]

Typical modelling results:
- policy can achieve deep cuts in emissions while maintaining strong economic growth
- no economic modelling shows long run reductions in living standards
Exploring the significance of signs \{+/-\}

What do you think would be the economic impact of [America/Australia] making significant reductions in greenhouse gas emissions, as part of global action involving all major emitters?

**Australia (2008)**
- 27% reduce living standards, so that incomes fall
- 35% slow the increase in living standards, incomes rise
- 14% can’t say
- 25% no noticeable effect on living standards

**USA (2008)**
- 20% reduce living standards, so that incomes fall
- 37% slow the increase in living standards, incomes rise
- 12% can’t say
- 31% no noticeable effect on living standards

Source: Phone poll conducted by Roy Morgan polling, reported in Hatfield-Dodds and Morrison 2010.
Exploring the significance of signs {+/-}

HYPOTHESIS:
Public support for policy to reduce emissions will be higher where:
(i) people are more confident in the climate science
(ii) the economic impact of achieving a given climate outcome is smaller
(iii) it is clear that incomes rise notwithstanding policy action

METHOD: “Would you support policy action to reduce emissions if…”
  Test hypothesis elements through:
(i) Questions on confidence, attitudes, demographics
(ii) Multiple impact levels in each framing, including up to 20 times higher than impacts projected by economic modelling
(iii) Three framing treatments to test the effect of providing information on increase in future income

Referendum Question Treatments:
“Would you support America participating in global action to substantially reduce greenhouse emissions and the risk of climate change if…”

<table>
<thead>
<tr>
<th>Forgone Gain (FG)</th>
<th>lower (−)</th>
<th>higher (+)</th>
</tr>
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<td>“…this action meant that, on average, personal incomes would grow more slowly, rising by $4500 rather $6000 by the year 2020? This is about $1500 lower than without policy action.”</td>
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<th>Opportunity Cost (OC)</th>
<th>lower (−)</th>
<th>not stated</th>
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Notes: US survey script.
Exploring the significance of signs +/-

Predicted support as a function of policy impact, framing and confidence

Key results:
- Framing and reference points effect the policy stance of 5-23% of respondents
- Effect is larger for higher levels of policy impact. FG vs AL effect is equivalent to:
  - doubling the scale of policy impact
  - improving US confidence from 3.0 to 3.3-4.3 out of 5.0 (equal or greater than the impact of drought on Australian public opinion)
- Results imply that a majority of US and Australian citizens would support policy involving forgoing a large share of future income growth as part of global action

Source: Steve Hatfield-Dodds @ANU CCEP workshop, “Signs and wonders in climate policy, March 2011

Why clarity on the sign of change matters #2

<table>
<thead>
<tr>
<th>ENVIRONMENTALLY CONCERNED</th>
<th>GENERAL CITIZENS</th>
<th>GENERAL BUSINESS/COMMUNITY</th>
<th>EMISSIONS INTENSIVE INDUSTRIES</th>
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<td>insertion not sustainable</td>
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<td>concern to minimise financial impacts on sector</td>
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<td>National and regional employment</td>
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<td>International contribution</td>
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<td>Fiscal impacts</td>
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Understanding:
(i) the separate roles of the carbon price and emissions target;
(ii) that incomes rise; and
(iii) that energy costs are manageable and affordability can improve; provides a potential pathway through Australia’s climate politics

Source: Jotzo, 2011, Carbon pricing that builds consensus and reduces emissions, CCEP WP 4-11.
Source: Steve Hatfield-Dodds @ANU CCEP workshop, “Signs and wonders in climate policy, March 2011
### Why clarity on the sign of change matters #2

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**Illustrative strategy:**
1. set medium term price so domestic emissions are expected to fall
2. set short run price to give confidence that impacts are manageable
3. ensure assistance does not cut incentives to reduce emissions
4. clarify target conditions if required

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### Signs {+/-} and wonders

**Key insight:**

People care about what goes up {+} and what goes down {−}

The sign of the change is more important than the magnitude of the change. This influences what people believe, how people behave, and what policies people support.

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- abatement task and tools
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Support for this research is acknowledged from CSIRO Emerging Science Program, Roy Morgan Polling and The Climate Institute


There is no wealth but life  
John Ruskin

References and further reading:

Hatfield-Dodds and Morrison, 2010, Confusing opportunity costs, losses and forgone gains, CCEP WP.9-10.  

Jotzo, 2011, Carbon pricing that builds consensus and reduces emissions, CCEP WP.4-11  


Department of Climate Change and Energy Efficiency (DCCEE), 2011, Australia’s emissions projections 2010 (December 2010, released February 2011), DCCEE/Commonwealth of Australia, Canberra