How Home Energy Rating Schemes Can Increase Energy Efficiency Initiatives

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Solar - Smarter

Whats the problem needing a solution?

- Current Buildings
  - Majority (pre 1977) have inadequate insulation
  - Low energy efficiency cf what is achievable
  - Health consequences of inadequate heated homes
  - Improvements seen as a luxury
  - Little attention to energy efficiency
- New Buildings
  - Little attention to energy efficiency
  - Energy efficiency improvements seen to increase cost
  - Improvements not reflected in the value of the building
  - Difficulty of valuing improvements

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HERS Requirements

- Scheme should be consistent for new and pre 1977 houses
- Must be integrated into the Building Code
- Methodology should be easy to apply
- Methodology should be consistent across NZ
- Should allow for a wide range of house designs
- Should not bias towards particular building elements
- Should be simple for the public to use
- Public must be able to see its value to them

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Options

- Can be used to set minimum standard for new houses
- Could include space heating choices
- Could include water heating choices

History of HERS

- Started in USA in early 1980s
  - Encouragement to home owners to implement energy efficiency measures
  - Targeted at new home construction and existing retrofit
  - Used financial incentives - lending
  - Ratings often provided free
  - Linked to DSM programs
- Generally Government driven
  - Extensive amount of research
  - Value of standardisation
- Late 1990's HERS have become more common
  - Mix of voluntary and mandatory schemes
  - Linked to building energy efficiency standards

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United Kingdom

- National Home Energy Rating Scheme (NHERS)
  - Voluntary HERS
  - Providing information to home owners and tenants + recommendations for retrofit
  - Linked to a variety of energy efficiency and heating subsidies
  - Developed by a registered charity in 1990
  - More comprehensive than SAP. In addition includes
    - Regional climate variations
    - Orientation
    - Household size and occupancy patters
    - Zoned heating patterns
    - The costs of cooking, lighting and electrical appliances

United Kingdom - SAP

- Mandatory HERS
- Requires builders to undertake a SAP on everyn new home and homes with extensions greater than 10m^2
- Alternative solution to prescriptive provisions of building regulations
- Aim also to make energy efficiency information available to the market
- Based on building dimensions, thermal properties of the building envelop, space heating and cooling, water heating equipment, internal heat losses and gains, solar gain, ventilation, weather conditions, and fuel costs.
- SAP assessment part of building consent process
- Rating between 1-120
- New house minimum 80-85

European Directive

- Directive that energy performance certificate available when buildings constructed, sold or rented
- To be introduced by January 2006
- Certificate to be accompanied by recommendations for cost effective improvement
- In UK require a Home Information Pack including a Home Condition Report which includes an energy efficiency assessment.

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Canada

- EnerGuide for houses
  - National HERS for Canada introduced 1998
  - Linked to energy efficiency grants
  - 2000 expanded to cover new houses
  - Aim is to develop a pool of energy experts to help homeowners
  - Assessment costs partly subsidised
  - Uses a 1-100 score
  - Homes given a rating label with estimated energy consumption
  - Used to verify eligibility for size of retrofit funding

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Australia

- 1986 national Five Star Design Rating Scheme
  - Ceased operation in 1989 due to lack of industry support
- 1992 Victorian HERS
  - check list method based on dwelling characteristics calculated in computer simulation (First Rate)
  - Informing homebuyers of the energy efficiency of a home
  - From 2005 new homes required to achieve a minimum of 5 Stars
- Nationwide Home Energy Rating Scheme (NatHERS)
  - Computer model analysis
  - Several States require calculation using NatHERS, FirstRate, or BERS as an alternative solution for establishing if new home design satisfies Building regulation requirements
  - AccuRate replacing NatHERS and FirstRate

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Australia

- Building Code of Australia
  - Requires minimum 5 Star rating for new single dwellings from 2006 for most climate zones.
- NSW BASIX
  - Building Sustainability Index (BASIX) applies to all new dwellings from July 2005
  - Sets greenhouse gas emission and water use targets
  - Covers the building envelope + wide range of household energy uses; heating and cooling, lighting, water heating
  - Uses NatHERS for simulating heating and cooling
  - Building fabric must comply with restrictive ‘Deemed to Satisfy’ requirements
- Green Building Council of Australia Green Star
  - Only available for commercial office buildings

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Australia - ACT

- ACTHERS operating in Australian Capital Territory (ACT)
  - Introduced in 1999
  - All dwellings require rating prior to sale or rent to obtain Energy Efficiency Rating (EER)
  - EER Statement must be included in advertising of the property
  - EER Statement form part of the Contract of Sale
  - All new housing and extension of existing require EER of at least 4 Star
  - Uses FirstRate which conforms to NatHERS
  - Objective
    - Community awareness of energy consumption of housing
    - Awareness of value of energy efficiency
    - Energy efficiency costs reflected in value of the house
    - Lead to improvement of existing housing
  - Evidence of higher prices for houses with high EER requires confirmation
  - Has increased awareness of value of energy efficiency

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USA

- 1980's home mortgage industry offered energy efficient mortgages –
  - larger loan for energy efficient home
  - Required standarised methodology for calculation dwelling energy efficiency characteristics
- Retrofit programs
  - Determine eligibility for loans
- 1993 Dept of Energy
  - Commissioned Home Energy Rating System Council to develop voluntary guidelines for ratings
  - Adopted by 47 States by 2000

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NZ Experience - Christchurch

- Christchurch Warm Home Energy Check
  - EECA/ECan pilot HERS 2002
  - Aim to resolve air pollution issues + Improve insulation levels in homes
  - Based on building envelope, ventilation thermal characteristics, building orientation and potential solar gain,hot water system and usage via shower flow
  - Assessments use a checklist approach
  - Does not take into account size of house, extent of exterior walls, rating of insulation, building age, construction materials, air leakage
  - Numerical rating converted into 6 Star rating
  - Disadvantage – older houses cant get a rating over 2.5 Stars
  - Ratings cost homeowner $99,
  - Ratings free for Clean Heat Project participants

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New Zealand – Waitakere City

- Tool for Urban Sustainability
  - Web based analysis tool
  - Inclusion of a number sustainable measures, water, transport, energy
  - Household energy and water use calculations based on NSW BASIX model
  - Expected to become operational 1 July 2006
  - Developers get $2000 rebate off development levy if they meet energy saving requirements

Use of HERS

- Most schemes are voluntary for existing homes unless extending
- Mandatory schemes usually linked to new home standards. Often used as an alternative solution for demonstrating compliance to building energy standards
- Generally low uptake of voluntary HERS
- Voluntary HERS uptake increases if subsidised and linked to retrofit funding
- Publicity and simplicity key to uptake
- Low energy efficiency improvement with voluntary HERS
- A critical mass necessary before HERS become useful for comparison of different houses.

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Set of Processes

- Information collection or audit
  - What to collect
  - Level of accuracy of data
- Rating model
  - Credibility of rating model
  - Balance within the rating model
- Analysis
  - Manual or computer based
  - Numerical score
- Rating tools
  - Instruction manuals, guides to assors
  - Software

Supporting Requirements

- Assessor training
  - Training requirement
    - Teaching material
    - Where / who?
    - Recognition of qualification
  - Accreditation
    - Where / how / who?
    - Commonality with Australia?
- Rating label/certificate
  - Value of a standardised label
  - Label recognition by public
  - Number of stars or score out of 100
  - Inclusion of energy measure
  - Inclusion on LINS?

Supporting Requirements

- Audits of assessments
  - Who?
- Marketing and public education
  - Whose responsibility?
  - Of no value if the public are not aware of the ratings
  - Public understanding of what the ratings mean
  - Education of real estate industry, builders, valuers

Types of Rating

- Prescriptive
  - Menu of equipment / efficiency requirements
  - Resembles minimum building standards
  - If meet the requirements deemed to meet particular energy rating
- Calculation – based
  - Based on model of energy consumption of homes
  - Computer based predicted performance relative to requirements for particular rating
  - Manual check list or computer analysis
- Performance – based
  - Actual measured building energy consumption data compared to required standards
  - Rarely used

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Rating Methodology

- Building envelope only
  - Based on assumption that the building structure is unchanged during its life of over 50 years
  - May include solar orientation
  - Does not include lighting or appliances as readily changed.
  - Assumes heating and cooling appliances may be changed or efficiency improved in 10-15 years.
- Building envelope + heating/cooling
  - Heating/cooling significant contributor to house energy use
- Building envelope + water heating
- Building envelope + space heating + water heating
  - Include all components into the calculation methodology

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Methodology Debate

- What factors to include depends on purpose of HERS
- Total energy = envelope + heating/cooling + hot water
- Total energy rating – how to compare each factor
- If appliances can be controlled through other means then don't need to include in rating
- Degree of simplicity should influence type of scheme

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Rating Tools

- Validity of the rating model is critical to acceptance
- What aspects of energy consumption should be included
  - Inclusion or not of heating/cooling and water heating
  - Should the rating include total energy consumption
- Some argue for exclusion of space heating and cooling - appliances mobile and easily changed.
- Some argue for inclusion of hot water as most components eg pipe insulation not easy to change
- Assumption – that higher rates houses require less energy has rarely been tested
- Not all rating models are effective in predicting energy efficiency homes.
- Value of commonality with Australia

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Summary

- Introducing HERS is not easy
- Mandatory adoption through the Building Code leads to greater energy efficiency improvement than voluntary approach
- Importance of getting the calculation methodology equitable
- Overseas experience we can learn from
- Methodology that tries to cover all energy can be too complex and leads to problems
- Spacing heating/cooling mobile and easily changed
- Need to consider methodology that evaluates building envelope and hot water separately but combines them into a single Star Rating

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