Raising the ceiling

experience from Europe on creating a market for near to net zero energy buildings

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EU policy framework

Re-cast EPBD (2010)/ Clean Energy for All (end 2016) package:

- All new buildings & buildings undergoing ‘major’ renovation to be ‘nearly-zero energy’ (nZEB) from 2020; decarbonized building stock by 2050
  - High load match building energy demand & onsite / nearby RE supply
  - Performance based rather than prescriptive (~15kWh/sq.f/yr)
  - Definition & speed of nZEB varies by country/region (for instance: city of Brussels mandates Passive House since 2015) but transition is happening

- Challenge
  - New buildings only make up about 1% of EU building stock
  - Rate of renovation is <1% per year → how to double/triple rate & depth of renovation?
Different approaches to EE

**Raise the floor** - for instance:

- Make it unacceptable to own inefficient buildings
  - UK: From 2018, F and G labelled buildings cannot be rented
  - France: By 2025, F and G labelled buildings must be renovated
  - Belgium: Since 2015, rental market must meet minimum insulation requirements
  - Netherlands: By 2023, mandatory phase out of rental homes and office buildings < C label (proposed)

**Raise the ceiling** - market models to accelerate the scale of NZEB, e.g.

- Energiesprong - net zero energy social housing in NL, UK, FR, DE and NY State
- Picardie Pass Rénovation - 3rd party financing for residential sector in FR
- Exemplary Buildings program in Brussels, achieving NZEB/Passive House from 2015

*Moving towards Ikea type business models to organize the supply chain & deliver mass renovation services*
Zooming in - experience from the Netherlands

Dutch government introduced Green Deal approach in 2011

Public-private sector collaboration program to accelerate uptake of green growth solutions; already >200 Green Deals (each GD runs 2-3 years)

Government acts as facilitator of innovative initiatives, e.g.:

- Maximizing the ‘from good idea to putting in practice’ ratio
- Removing legislative & regulatory hurdles
- Providing access to networks, and/or to capital providers

Potential Green Deals need to prove their potential for:

- green growth, inspiring others to do the same, delivering rapid results, becoming profitable, and facing implementation hurdles that central government can remove
Green Deal “Blok voor Blok” - approach

- **Aim:** large scale (2000+ units/project) energy reduction for existing housing stock; at least 2 ‘labels’ better than current or label B energy performance
- 13 pilots in 13 municipalities (2012-2014) - consortia of at least 3 parties - understand if it’s possible to achieve this through market models
  - Rental market as well as home owners; DIY to full-service + hybrid
  - Supply push / demand pull approaches
  - Exploring leverage points for engaging residents (ambassadors, marketing, coaches)
  - Paid vs. free of charge support packages
  - ‘All welcome’ to targeted approach (energy intensive; older homes; high/low-income; retired residents, etc)
  - One-by-one to street-by-street approach

Green Deal “Blok voor Blok” - findings

- Too much focus on push (products & services), not enough pull (value proposition; personal contact)
- Adoption curve:
  - Strong focus on tiny group of ‘innovator’ residents (= high intrinsic motivation; doesn’t identify with majority)
  - Not enough focus on ‘early adopters’ & ‘early majority’ to enable transition to scale
- Understanding the customer journey:
  - Awareness comes before desirability, comes before exploring solutions
- Overestimating the ‘neighborhood effect’:
  - Many urbanites more connected to others through work, schools, sports etc than area they live in
- Opportunity to use renovation for additional improvements:
  - Deferred maintenance, earth quake resistance, adaptations to facilitate elderly
Energiesprong, Stroomversnelling & Nul op de Meter

- 6-year Dutch gov. innovation program Energiesprong (2010)
  - Experimental program to find out what works/doesn’t to scale energy renovations, e.g. ‘Smart&Fast’ experiments under great interest of media
  - Energiesprong Housing Renovation (2012):
    - Achieve 80% energy reduction for at least 10 projects of at least 30 rental homes each; subsidies for beyond-regulatory-compliance cost; to be repaid if >15% below target
- Led to **Green Deal “Stroomversnelling” (“Rapids”) rental homes**
  - Private sector & housing corporations to transform 111,000 - of which 11,000 homes by 2017 - to become “Nul op de Meter” (zero on the meter/energy neutral)
  - ‘Use’ energy bills to deliver jobs in construction market
  - Integrated & collaborative approach - disclosure of data & learnings
- Green Deals: energy neutral owner-occupied homes, schools, etc

“Nul op de meter” (NOM) concept - requirements

Four bold requirements:
- Scale (high volume)
- Speed (construction completed in 2 weeks or less)
- Self-financing (paid for via energy savings: ‘energy performance’ payments to housing corporation similar to residents’ former energy bill of last 3 years), and
- Desirable (residents keen to participate)

Moving away from step-wise / piecemeal approach to improving energy performance to more radical, high-speed ‘re-new-vation’ of homes

Initial focus on post-war social housing: poor quality, low rent, high energy use
"Stroomversnelling" NOM deal- stages

Three stages - different paces Green Deal participants

- Experimenting & prototyping
  - Let a 1000 flowers bloom / creative competition: participants each develop their own (1 or more) propositions through trial & error

- Industrialization
  - Mobilizing building industry to turn innovative solutions into products than can be produced on industrial scale

- Scaling of NOM renovations & expansion into other building segments
  - Aggregating demand; understanding required scale per region to be profitable
  - Developing financial models to capture energy savings: ‘energy plan’
  - Engaging regulatory agencies to help facilitate widespread adoption
  - Trialing NOM for high rise, offices, schools, care homes
NOM: incentivizing & challenging the market

- Innovation in products, processes (integration), marketing and operations
  - Prefab elements with customisation per project
  - 3d-scans and simulations to ensure perfect assembly and fit
  - New cooperative business models aligning design, production, assembly and customers

- Sharp reduction in cost (although not enough)
- Snow ball effect: initial vanguards attract an ever growing ‘coalition of the willing’
- Rapid pace of innovation: forces other parties to step up their game -> race to the top

NOM biz case/fin example

- Tool for housing corporations to calculate max. feasible NOM investment / unit, assuming 5.25% IRR, considering:
  - Income from ‘energy plan’ payments over 30/40 year period (= performance warranty)
  - Increase in aggregated rental income as result of prolonged econ. lifespan
  - Potential increase in monthly rent, (only) if the corporations so desires
  - Higher remaining value (in case of sale/demolition after 30 years)
  - Cost of mandatory upgrade of units to B (energy) label: 30% better
- Focus on older, relatively inefficient homes < 4 floors
Examples - innovation in NOM market

- VolkerWessels (developer): NZE renovation in just 1 day
  - Now also selling MorgenWonen (MoveInTomorrow) new-build NZE prefab homes
- Factory Zero startup: selling industrial components for NOM renovations
- Housing corporation Woonbedrijf, Westvoorne:
  - Has sold off some of its affordable housing stock to encourage home ownership
  - For NOM, it continues to own the façade & subseq. ‘lease’ it back to home owner, who pays an amount (energy plan’) similar to its former energy bill
- Home owners association, Assen:
  - Association takes out 30-yr loan for NOM renovations; loan tied to objects/not owners; province provides guarantee (‘collateral’)

Challenges - NOM renovation

“Stroomversnelling” Deal didn’t reach its targets - 11,000 rental homes renovated by 2017

- ‘Missing the target, hitting the point’

- Challenges:
  - Total upgrade cost has to come down further
  - Onsite RE for >4 floors (nZEB possible)
  - Focus on innovation vs. collaboration
  - Communication & behavior change residents
  - Aligning different stakeholder approaches
  - Conservative sector
  - ......
Looking forward

- Anchoring of NOM concept/standardization:
  - NOM quality label (2016)
  - EP finance model (‘energy plan’) in Dutch civil code
- Energiesprong concept has gone international:
  - UK, Germany, Belgium, Luxembourg, NYC (NYSERDA - RetrofitNY), San Francisco
- Energiesprong as innovation program no longer exists
  - Transition continues, 100,000 units ‘in the pipeline’ for 2025
  - Will enough parties join to make NOM mainstream?
  - Will the pace of NOM renovation be sufficient for a carbon-neutral stock by 2050?
  - When will the EU expand carbon neutrality goals to include embodied carbon? (circular economy)