

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)



Different approaches to EE

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

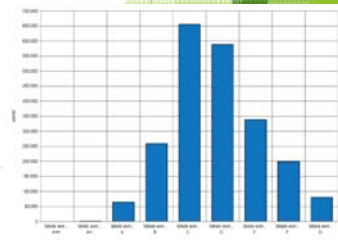


Green Deal approach

- ▶ 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-ation' of homes

Initial focus on post-war social housing: poor quality, low rent, high energy use



“Stroomversnelling” NOM deal- stages

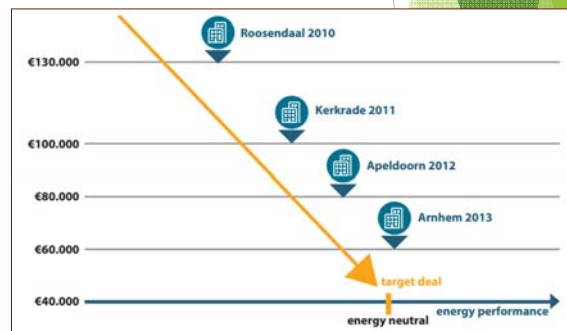
Three stages - different paces Green Deal participants

- ▶ 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

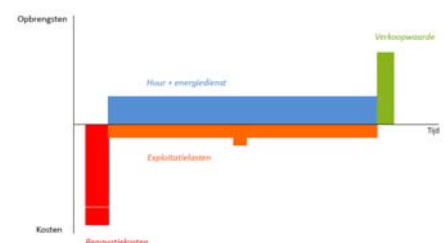
- ▶ Innovation in products, processes (integration), marketing and operations
 - ▶ Prefab elements with customisation per project
 - ▶ 3d-scans and simulations to ensure perfect assembly and fit
 - ▶ New cooperative business models aligning design, production, assembly and customers
- ▶ **Sharp reduction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

Businessmodel vernieuwbouw naar NOM



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)

