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International examples of supporting "green energy" projects in municipalities

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Municipal Energy Reform Project in a nutshell

Purpose

→ Enhancing Ukraine's energy security. Combined with related economic growth activities and improved governance, it will help the GOU build sustainable democracy through broad-based economic growth.

→ To reduce and mitigate GHG emissions resulting from inefficient uses of energy at the local and national levels.

Budget

16.5 mln USD

Time

September, 2013 – March, 20178

ВЕРХОВНА РАДА УКРАЇНИ

Ministry of Regional Development, Construction and Housing and Communal Services of Ukraine

MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF UKRAINE

ДЕРЖЕНЕРГОЕФЕКТИВНОСТІ УКРАЇНИ

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Potential roles of cities in accelerating for RES

Target setting

- Align stakeholders to targets beyond common goals, examples of cities of 100% RES

Regulation

- Land-use planning, building codes, grid connection rules, technical standards, housing programs, specific ordinances, tariff regulation

Operations

- Owners and operators of utilities and infrastructures can influence directly mix of energy

Consumption

- Aggregated demand and procurement can impact on type of energy to be consumed, competition, prices.

Financing

- Taxes, loans, guarantees, subsidies, incentives, direct funding vis a vis RES solutions.

Advocacy

- Influence choice of people and businesses, unite advocacy on national level.

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Source: IRENA, 2016

Target setting – cities announce their targets

96 cities have announced their aiming for100% RES as of 2016
– the number keeps growing continuously

Europe is as much dense as Americas with cities targeted on 100% RES
- location determines the general natural conditions but also the way of thinking

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Target setting – comes with a Roadmap

Stockholm, Sweden - a Clean Sustainable Capital by 2050, based the Action Program on Climate approved in 2007

Malme, Sweden – climate neutral and having all municipal operations run on 100% RE by 2030.

Roadmap would include a number of measures, from a "Clean Vehicle" target to the "Phasing-out of all Fossil Fuels", including "Open District Heating", "Europe´s largest biofuel-fired CHP plant", etc. by the date.

City target – is well established in the wider national policy for RES.

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Target setting – is a matter of vision

- Kisieliece, Poland –
  - a small town with a vision and determination in a "coal-addicted country";
  - is now 100% powered by locally-produced renewable energy:
    - 2 wind farms (50 turbines) at 94.5 MW;
    - biomass CHP of 6MW operates on cereal straw - supplies heat via DH system to 90% of population;
    - biogas power plant on local corn silage – 1 MWe and 1 MWt;
    - Solar – 3 panels each 10 kW on every municipal building;
  - and serves local communities with income on rent, demand on straw, local jobs.

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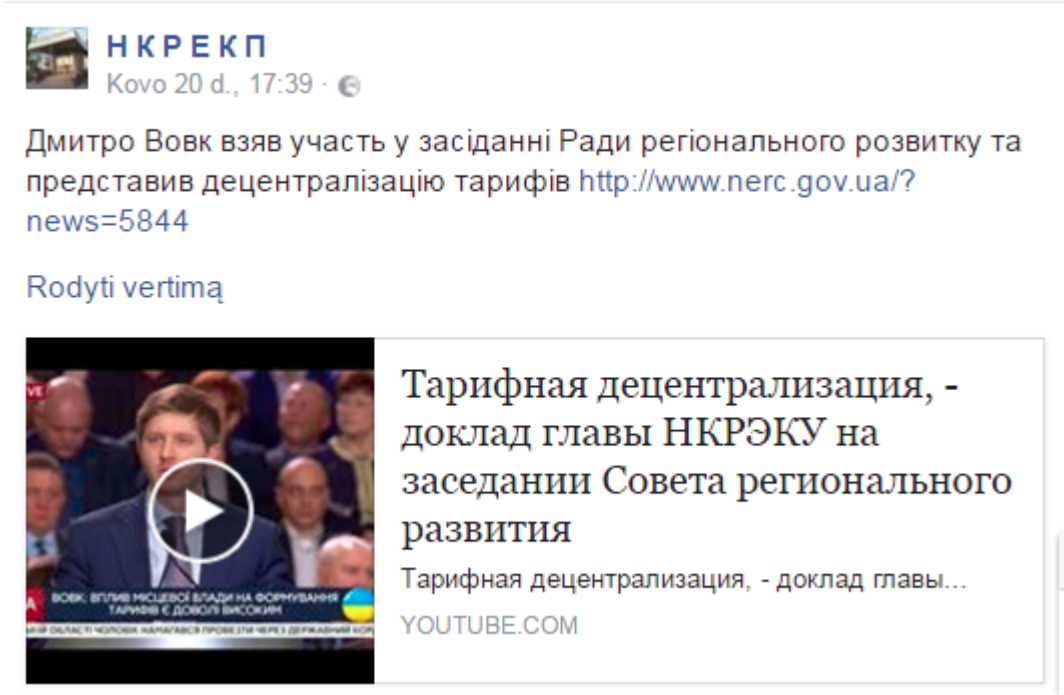
Regulation – municipalities are increasingly influential

- Municipalities may use their legislative and regulatory powers to incentivize, oblige and request their DH entities act the way needed.



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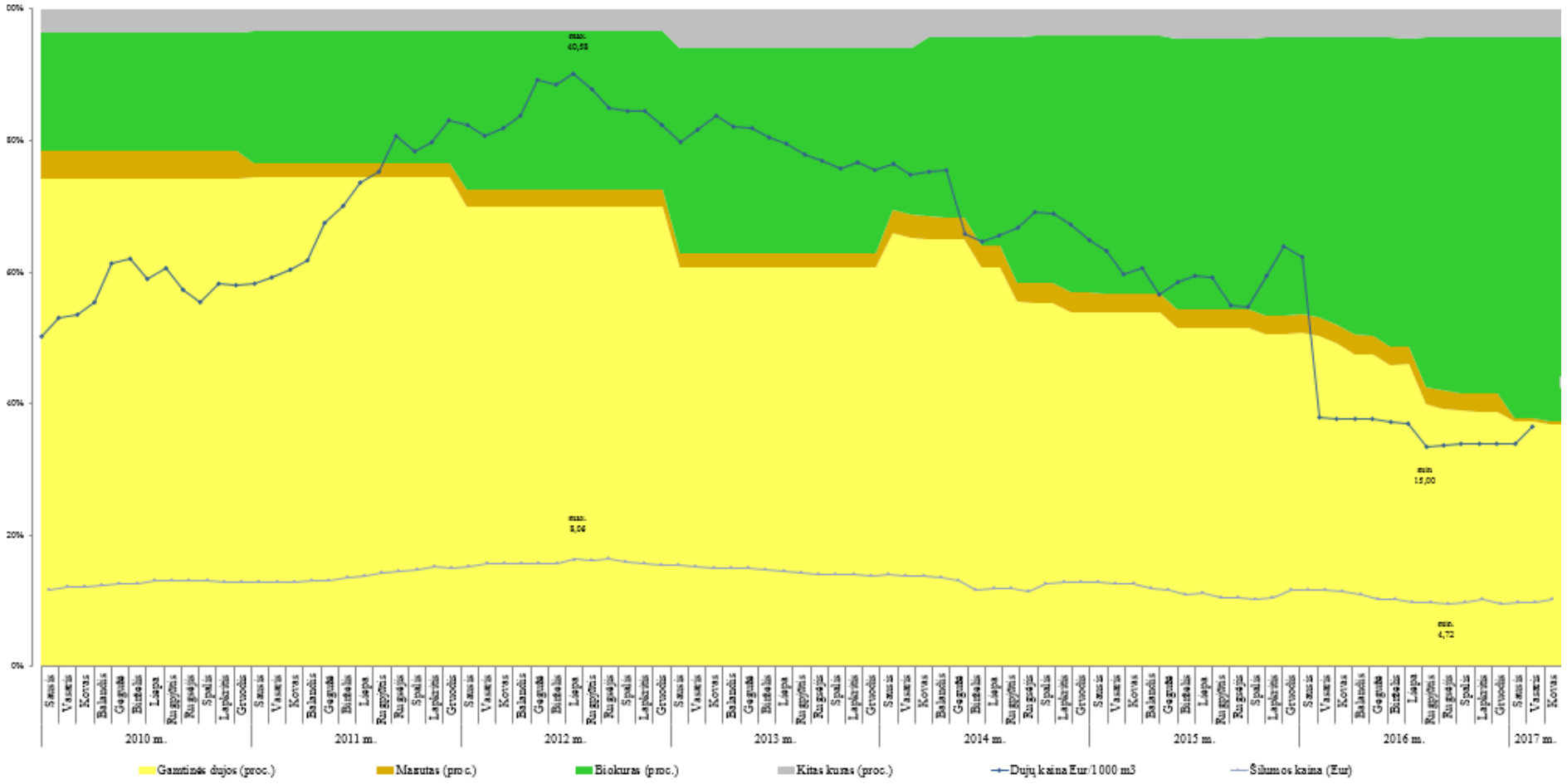
Regulation – competitive market driven Lithuanian approach



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Time - 72 months

Structure change – from 18.1% to 58.4% thermal energy via RES

Regulation – competitive market driven Lithuanian approach

Regulatory incentives (primary	Organization of Biomass market	Competition in DH/generation open-up	External factors

• 2009-2013 applied extra 6 % for 7 years on investment into RES by DH entity (on standard 5% WACC)
• Priority to be purchased if thermal energy is green
	• Biomass exchange – established & licensed in 2012
	• Obligation to purchase via BEX
	  • 2014 – 10%
	  • 2015 – 50%
	  • 2016 – 100%
	  • enforcement by NRI
		• Law in 2010
		• Regulatory framework in 2011
		• Market impact
		  • # of IHP almost equals to # of incumbents
		  • 85% is via RES
			• Sky rocketing NG price – up to 40 EUR/MWh
			• Financial support to switch
			  • ≈ 10% of all investment performed
			  • No D, no RRR on subsidies, grants, donations

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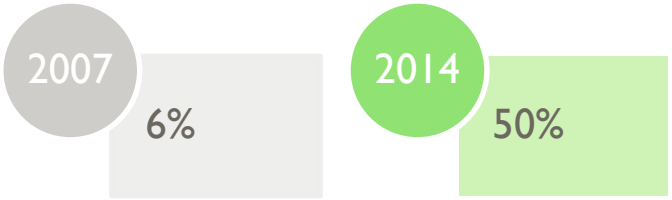
Regulation - elegant way of Estonia

- Ex-ante long term announcements of regulatory obligations and enforcement through price incentive:
  - Example of network efficiency targets : annual decrease must be ensured by 1%, starting with 21% in 2011(15% in 2017)
- New provisions for District Heating Law to establish approach of a regulatory model - simple yet holding powerful incentives:
  - one reference tariff for a country, based on three types of modelled entities;
  - no regulation at all if tariff is within the reference;
  - no zoning in municipalities.

Thermal energy produced via RES in DH systems

Share of biomass in CHPs



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Operations: example of Vienna to manage waste

- Since 2009, residual waste is not landfilled, as 3 incineration plants are serving DH and DC needs;
- Old landfill equipped to produce power by private company, convey to network and supply 2200 households (as of 2012);
- Financed via residual waste management fee to property owners (except packaging material, used appliances and batteries);
- Biogas from kitchen waste – 1.7 mln m3/year supplied as almost pure bio-methane (methane 99%) into gas network as natural-gas substitute to serve 900 households (operational since 2015);
- System managed by Municipal Department for Waste Management, Street Cleaning and Vehicle Fleet.

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Operations: example of Rotterdam share and combine

- Among multiple means of energy and infrastructure collaboration at site petrochemical cluster and other industries to be noted – Rotterdam heat company takes residual heat for DH in the city. Project initiated and owned by inter alia Province of South Holland, the Municipality of Rotterdam, private entities.

Nieuwe Warmteweg

The Nieuwe Warmteweg is a 26-km underground pipe network which transports heat from waste and energy company AVR to the Rotterdam city centre where it is used for district heating.

Leiding over Noord

Via the 16.8-km Leiding over Noord pipeline, energy supplier Eneco transports residual heat from waste and energy company AVR in Rozenburg via Vlaardingen and Schiedam to the district heating network of Rotterdam.

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Consumption: example of Finnish procurement

- In Finland, 34 municipalities – including Helsinki, Tampere, Oulu and Seinäjoki – to take part in the joint procurement of solar power plants, to install rooftop systems on hospitals, schools and other municipal buildings. Joint municipal procurement enables reducing cost;
- Finns would use KL-Kuntahankinnat Oy – entity already acting on behalf of the regional and local governments.
- Community Choice Aggregation (CCA) model, used in USA, expands to wider geography:
  - Established entity negotiates rates
  - Ensures increased share of RES to requested level

Kunta hankinnat

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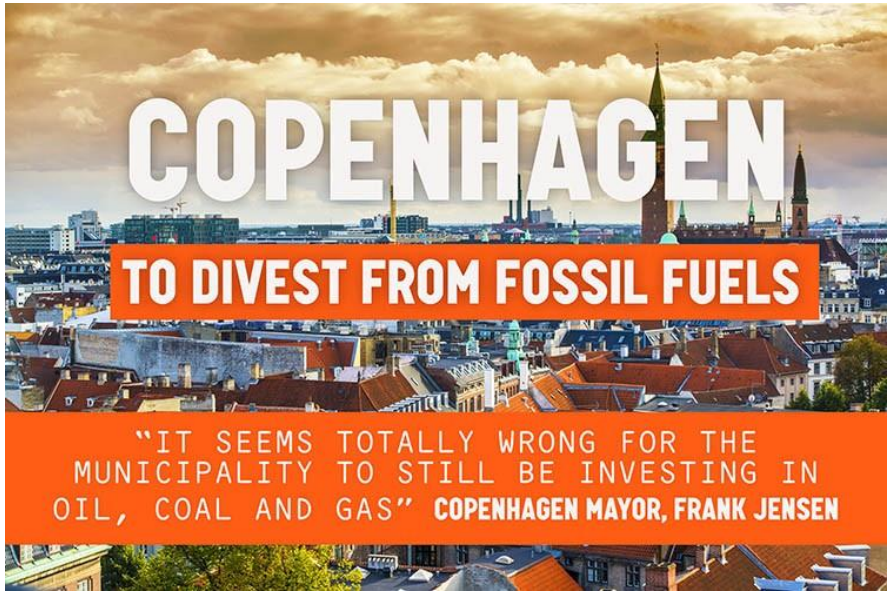
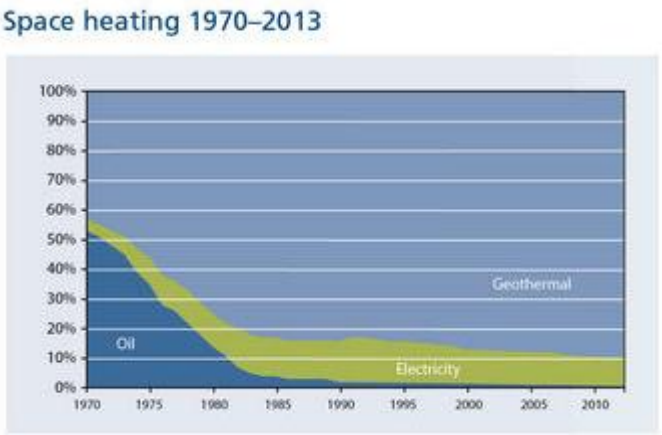
Financing – through actions of city's investment funds



- Copenhagen, Denmark, is aiming to become the first carbon neutral capital by 2025. In December, 2015, the city announced plans to shed coal, oil and gas from the city's 6.9 billion kroner ($1.1 billion) investment fund.
- Oslo, Norway, announced on moving out $7 million of coal investment in Olso council's pension fund (2015).

- The Icelandic Government set up an Energy Fund to further increase the use of geothermal resources in the country: over decades, loans granted for geothermal exploration and drilling, yet converted into grants where drilling failed to yield expected results.



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Financing – joint action by several municipalities

- Finnish MANKALA model – for ownership and financing a project:
  - A number of municipalities and operators create a joint venture, each owning a small share.
  - Company sells the electricity and heat to shareholders at no profit.
  - The shareholders commit to paying the company's costs in proportion to their shares.
  - As a result, the Mankala company becomes de-risked and can obtain high credit ratings, thereby attracting low-interest, long-term loans with high financial leverage.
  - Finally, as it commits to zero profit, it pays no taxes.

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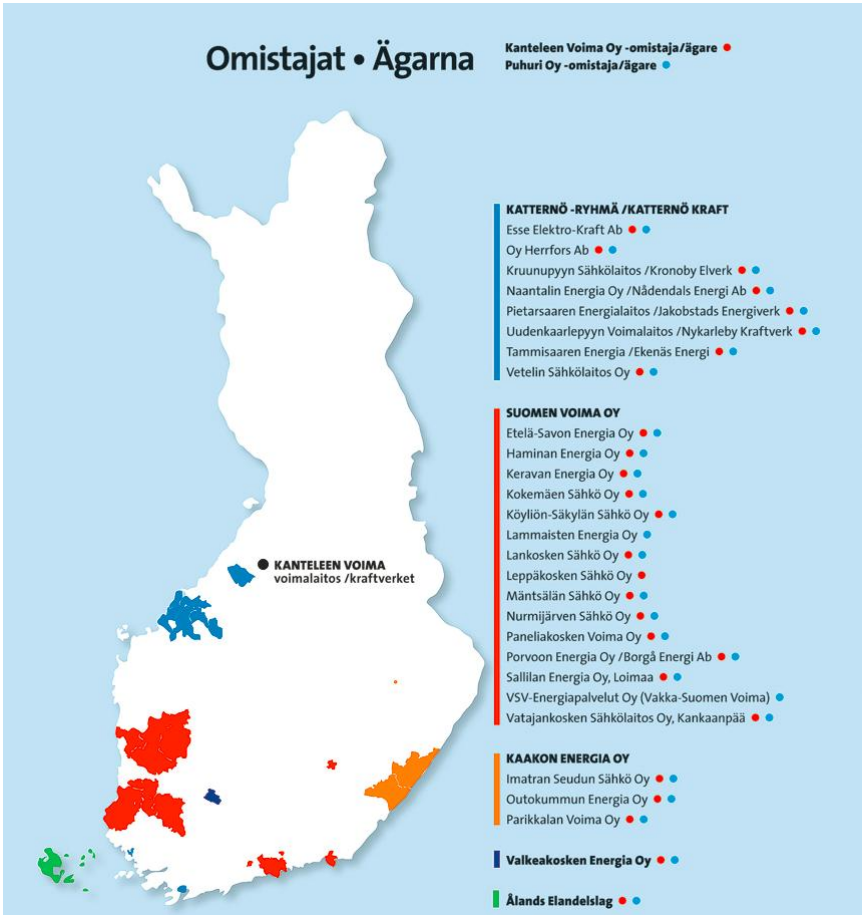

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Financing – joint action by several municipalities

- DH company "Panevezio energija", Lithuania:
  - financially owned by 7 municipalities (small share of private ownership),
  - exploits 300+ km of DH network;
  - operates 100 generating units;
  - supplies 700 GWhs of thermal energy to network;
  - Incorporates 23% of thermal energy produced by external generating units.

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Financing – municipal bonds

- Gothenburg, Sweden:
  - issued first green bonds in September, 2013, selling $60 million of debt;
  - more bonds in 2014 and 2016;
  - eligible projects include renewable energy (solar, wind, wave and hydro), energy efficiency, waste management, biofuel production from forestry waste, and smart grids.
- Not many cases reported so far on this type of financing by municipalities.

- City's DH company operates:
  - DH network 1000+ km length,
  - 74% heat from recycled energy - waste, industrial excess heat, sewage and flue gas condensation)
  - 17% comes from renewable energy (biofuel)

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Advocacy - Copenhagen International School

- Opened in January 2017, Copenhagen International School's new building features the largest solar facade in the world, along to full variety of other technologies employed;
  - the 12,000 solar glass panels – total area of 6,048 m2 - can generate 300 MWh of electricity per year, more than half of the school's annual energy needs;
  - tiles' distinctive 4 colors without using any pigments and without reducing energy efficiency - special nano filters to reflect wavelengths, and the rest of the sunlight is absorbed by the solar panel and converted into energy;
- Sustainable environment since early years –build-up long-lasting future choices by people.

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Source: www.ecowatch.com/

Driving RES - means costs or profit to municipality?

Frankfurt City, Germany – 100% of consumed energy from local and regional RES by 2050, thus way:

- bring down its current energy import costs of €2 billion a year to zero;
- generate additional income in the form of revenues and tax incomes on local and regional businesses;
- by prioritizing energy production from within the city and from the surrounding region – while still being connected to the larger national grid – the money will stay in the region;
- energy efficiency measures have saved Frankfurt €100 million in energy costs, a number that is projected to rise;
- finally, the city has reduced emissions by 15% since 1990, while its economy grew by 50% for its approximately 715.000 inhabitants.

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How rich ones needs to be to afford RES ?

- As of 2016, there are 4 countries in the world running on RES at 100% or almost 100%
    - Costa Rica – Iceland – Albania – Paraguay
- Some examples on tenders for RES power
    - 24.2 USD/MWh – AbuDhabi, solar - September, 2016
    - 29.1 USD/MWh – Chile, solar – August, 2016
    - 66.80 USD/MWh – Denmark, offshore wind – September, 2016
    - 80,00 USD/MWh – Netherlands, offshore wind – September, 2016
    - 25,00 USD/MWh – Morocco, onshore wind – January, 2016
    - 49,00 USD/MWh – Norway, onshore wind – June, 2016
- Factual prices of DH as of March, 2017:
    - 4.14 ct/kWh on RES and 7.41 ct/kWh on gas by comparable size companies

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Energy policy and planning paradigm shift

ENVIRONMENT | Wed Mar 1, 2017 | 8:33am EST

Antarctica hits record high temperature at balmy 63.5°F

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