SEAD SUPER-EFFICIENT EQUIPMENT AND APPLIANCE DEPLOYMENT INITIATIVE

Governments Working Together to Save Energy.

SEAD Policy Exchange Forum

The Road to Low Carbon Heating Systems: Policies and Approaches for Success 4 October, 2018 12:00 PM - 2:00 PM (UTC)

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Welcome, Introductions & Agenda

Lina Kelpsaite, CLASP



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Who is on today's call?

- **CLASP** SEAD Operating Agent and SPEx coordinator
- Presentations from:
 - International Energy Agency
 - Natural Resources Canada
 - Swedish Energy Agency
 - European Heat Pump Association
- Participants on today's call include policy makers, industry representatives, civil society, consultants, international organizations



SPEx Call Agenda

- Welcome, Introductions, and Agenda Review
- Introduction and Overview of Heat Pump Technologies, Existing Policies and Sector Challenges
- Case Studies:
 - Canada's Deployment of Cold Climate Heat Pumps
 - Lessons Learned from Sweden Successes through Incentives
 - Heat Pumps key technology to achieving Europe's energy and climate goals
- Q&A and Group Discussion
- Closing Remarks



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- Record of discussions
 - Webinar is being recorded
 - Presentations and Summary of Discussions available on SEAD website



A Global Initiative: SEAD governments work together to save energy





Foster Global Collaboration & Partnership



Welcome to the SPEx!

Introduction and Overview of Heat Pump Technologies, Existing Policies and Sector Challenges

John Dulac – International Energy Agency

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John Dulac - Buildings Sector Lead, International Energy Agency

John Dulac is an Energy Analyst in the Directorate of Sustainability, Technology and Outlooks at the International Energy Agency. He leads the energy technology and policy analysis in the buildings sector, contributing to IEA efforts to better understand the implications for an energy-efficient, low-carbon economy. He also is responsible for the IEA's Buildings Coordination Group, which brings together nine buildings technology collaboration programmes (TCPs) working on a range of sustainable energy technologies related to the building end-use sector, including solar heating and cooling, heat pumping technologies, building envelopes and design, energy-efficient equipment and appliances, and district energy solutions. John holds a double masters from Columbia University and prior to joining the IEA in 2011 worked at the Asian Development Bank.

Heat Pumping Technolgies

Existing policies and sector challenges to meet low-carbon ambitions

John Dulac, International Energy Agency – 4 October 2018 SEAD Policy Exchange Forum – Low Carbon Heating Systems

The world is getting hotter

The need for cooling is growing – and with it demand for air conditioning.

And weather is getting more extreme

But we shouldn't forget that heat still represents more than 50% of global building energy demand.

Buildings are a major driver of energy & emissions

2015 Global Energy and CO₂ Emissions

Heating and cooling represent 60% of building energy use and nearly 55% of buildings sector emissions.

Markets are not shifting fast enough to high-efficiency products

■ Fossil fuel equipment ■ Conventional electric equipment ■ Heat pumps ■ District heating and cooling ■ Renewables

Fossil-fuel equipment still represents half of heating equipment sales. Low-efficiency electric heating equipment represents another 25%.

Source: IEA Tracking Clean Energy Progress 2018

Energy policies and prices play a big role in market decisions

Energy prices are a critical influence on energy technology choice.

Source: IEA Energy Balances and Statistics 2018

Are we moving towards a cleaner energy system?

Tracking clean energy progress dashboard

Heating in buildings is not on track to meet low-carbon ambitions.

Source: IEA Tracking Clean Energy Progress 2018

Little is being said about a clean energy transition for buildings

Many of the 194 NDCs do not mention key technologies that would improve buildings sector energy-efficiency and carbon intensity.

Source: GABC Global Status Report 2017

A major push is needed to drive low-carbon, energy-efficient heat

Evolution of heating equipment in buildings to 2060

Efficient, sustainable solutions like heat pumps, solar thermal and district heat can be achieved – but markets will need a big push...

Source: IEA Energy Technology Perspectives 2017

- Energy prices are a key factor
 - > (Upfront) technology costs need to be attractive
- Technology packaging is important
 "Plug & play" solutions are needed, especially in existing applications
- Adaptation and flexibility can drive change
 - > Do consumers need to adapt to technology...or should technology adapt to consumers?
- "It's the market, dummy"
 - > Policies and market levers need to point to what we expect...and what we won't accept

Canada's Deployment of Cold Climate Heat Pumps

Katherine Delves - Natural Resources Canada

SUPER-EFFICIENT EQUIPMENT AND APPLIANCE DEPLOYMENT INITIATIVE

Katherine Delves – Manager of Standards Development, Natural Resources Canada

Katherine Delves is the Manager of Standards Development in the Office of Energy Efficiency at Natural Resources Canada. She is responsible for overseeing the Government of Canada's energy efficiency standards development program as it pertains to equipment and appliances.

She has almost 20 years of experience managing and leading regulatory and strategic initiatives within the Government of Canada as well as representing Canada in numerous international collaborative efforts. Prior to joining the government she worked with small and large hydro electric utilities leading maintenance and retrofit activities and providing key account support for industrial energy management. Most recently she has played a leadership role in the development Canada's market transformation roadmaps for key equipment in support of the Pan Canadian Framework on Clean Growth and Climate Change. She holds a Master of Laws degree from Osgoode Hall Law School at York University and a Bachelor of Engineering (Mechanical) from McMaster University.

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Deployment of Cold Climate Heat Pumps

Overview of current and planned activities

Katherine Delves Natural Resources Canada

October 4, 2018.

OBJECTIVES

Highlight progress-to-date in deploying cold climate 01 heat pumps in Canada

Provide an overview of current NRCan activities related to heat pumps

Respond to questions

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SPACE HEATING IN CANADA

64%

64%

Of energy consumed in homes used for space heating

Homes heated with natural gas or propane

10%

Electric system sales using heat pumps.

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ASPIRATIONAL GOALS FOR SPACE HEATING

2025

2030

2035

All fuel-burning technologies for sale meet an energy performance of >= 90% (condensing)

All air-source heat pumps for sale meet a seasonal co-efficient of performance (SCOP) of >2.5

A residential natural gas heat pump with a SCOP of >1.2 is costeffective (R&D target)

A residential cold climate air-source heat pump with a SCOP of >2.75 is cost-effective (R&D target)

Renewable technologies/resources are supported

All space heating technologies for sale meet an energy performance of >100%

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MARKET TRANSFORMATION STRATEGY IS A LONG TERM SOLUTION TO HEAT PUMP DEPLOYMENT

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TRANSFORMING THE MARKET FOR HEAT PUMPS – THE CHALLENGE

KEY BARRIERS

- For electric heat pumps to cost effectively perform under cold climate conditions
- No standardized test procedures and limited testing facilities for rating energy performance in cold temperatures
- High upfront cost and consumer skepticism over performance and long term maintenance
- Qualified installers are not available across the country performance of the heat pumps depends on the integrity of the installation
- Gas heat pump technology lags behind the advances in electric heat pumps, and lacks key market and technical development to demonstrate functionality in cold temperatures

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MARKET TRANSFORMATION ROADMAP

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HEAT PUMPS – OVERCOMING THE BARRIERS

RESEARCH AND DEVELOPMENT INITIATIVES

- Develop high efficiency lower cost cold climate heat pumps 1.
- Develop hybrid heat pump solutions, controls and installation guides 2.
- Address ductless heat pump installation issues for existing homes 3.
- Reduce ground loop installation costs for ground source heat pumps 4.
- Develop lower costs components for gas heat pumps 5.
- Conduct lab and field testing for gas heat pumps in cold climates 6.
- Lab and field testing for advance technologies 7.

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HEAT PUMPS - OVERCOMING THE BARRIERS

DEPLOYMENT INITIATIVES

- 1. Demonstrations of cold climate heat pumps (CCHP) to support national marketing
- 2. Demonstrations of gas heat pumps to educate consumers and industry
- 3. Ratings and qualified product lists for CCHPs
- 4. Sizing and selection software tools
- 5. Market pull for high efficiency space heating systems
- 6. Test procedures and ratings for combination space and water heating heat pump systems
- 7. Test procedures and ratings for gas heat pumps
- 8. Training and contractor certification program
- 9. Expand access to and uptake of existing and future incentive programs
- 10. Harmonisation of codes and standards
- 11. High performance specifications for CCHPs

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SHORT TERM ACTIVITIES RELATED TO HEAT PUMPS

CURRENT FEDERAL ACTIVITIES

- Developing cold climate heat pump test procedure [CSA EXP07]
- Building laboratory testing capabilities to new test procedure at lower temperatures and dynamic settings
- Developing a sizing and installation guide for cold climate heat pumps
- Developing and posting more detailed and technical content on heat pumps
- Testing gas fired heat pump prototype at government research labs

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NEXT STEPS

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QUESTIONS ?

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Lessons Learned from Sweden – Successes through Incentives

Carlos Lopes - Swedish Energy Agency

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Carlos Lopes – Senior Policy Advisor, Swedish Energy Agency

Since receiving MSc from the University of Coimbra in Portugal in 1992, Carlos has been working in the energy field. He worked at the Portuguese National Energy Agency and as research engineer at Ecole des Mines de Paris in France. Carlos served as advisor for energy affairs in the Portuguese Government and is the author of c.a. 30 articles. Carlos joined the Swedish Energy Agency in 2003, where he is senior policy advisor for energy efficiency policies. He has served in several committees within the European Union, Energy Charter and the International Energy Agency. He has been member of the board of ECEEE – European Council for an Energy Efficient Economy and chair of the working group on Ecodesign of the Network of European Energy Agencies. Since 2009 he is Swedish negotiator for implementing the Directives on Ecodesign and Energy Labelling. Heat Pumps in Sweden Factors behind the market developments

Carlos Lopes

Swedish Energy Agency

SEAD Policy Exchange Forum – Low Carbon Heating Systems October 4

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2018-10-04

Energy use for heating in detached houses

Energy use for heating and hot water One- and two-dwelling buildings

2018-10-04

Heating oil almost phased out

Resistance heating being replaced by heat pumps (incl air-air)

District heating (biomass) increases

GHG emissions reduced 91% since 1990

Heat pump market in Sweden 1981-2017

Source: SKVP

Penetration of heat pumps for central heating in detached houses

37% of houses with heat pumps for hydronic central heating (0,75 million)

Almost a quarter of houses have ground source heat pumps

Highest penetration of heat pumps per capita in the world

Factors that contributed for the development of heat pumps in Sweden

The Broad context: Energy infrastructure and prices

"Cheap" electricity, low electricty/oil ratio

Expensive heating oil (due to taxes)

Gas almost not available

Competition with district heating

Energy prices in the residential sector (EUR cent/kWh)

2018-10-04

A comprehensive and coordinated policy framework ? Research, Development and Dissemination

A comprehensive and coordinated policy framework ? Economic, administrative, information & advice

Taxes	Tax on heating oil
Subventions	 90'ies, 00'ies, tax credit for replacement of oil boiler Tax credit for installation work
MEPS and Labels	 Ecodesign requirements at EU-level Energy labelling
Information, advice and testing	 Tests and information targeted at consumers Trained municipal energy advisers Pressure on manufacturers and installers "Cleans" the market from less serious actors

Manufacturers and installers, and trade organisations Competition AND collaboration

Collaboration within the trade organisation	 Collaboration for competing with district heating Collaboration for influencing the ecodesign and labelling process
Competition between manufacturers	Stimulates innovationPossibility for export market and foreign investment
Skilled and efficient installers for competitive prices	 Training programmes by manufacturers and/or trade organisation Certification of installers started before it became an EU-obligation
Creating consumer trust	 "Board for consumer disputes for Heat Pumps" to administer and mediate conflicts between consumers and manufacturers. Inspired on the "National Board for Consumer Disputes"

Heat Pumps – Key Technology to Achieving Europe's Energy & Climate Goals

Thomas Nowak – European Heat Pump Association

SUPER-EFFICIENT EQUIPMENT AND APPLIANCE DEPLOYMENT INITIATIVE

Thomas Nowak – Secretary General, European Heat Pump Association (EHPA)

Thomas is a long term (renewable) energy aficionado. Apart from closely following the energy transition both in the electricity and heating sectors, he is the owner of a heat pump, a PV power plant and a building, in which, both cooperate peacefully. In his professional life, Thomas represents the EHPA as Secretary General in Brussels. His main responsibilities are the representation of the industry at the European institutions, networking with other stakeholders in the field of heating and cooling, as well as the management of the association and its future development. Thomas has published several articles on heat pump technology and the integration of heat pumps in the energy system and has spoken on this topic in European and international conferences. He has also been contributing to scientific publications including the IEA energy technology perspectives and the REN21 Renewables Global Status Report. Before working for the EHPA, he worked in several projects on the economic and social benefits of renewable energy. Thomas holds a university degree in business administration and economics.

Heat pumps – key technology to achieving Europe's energy and climate goals

Thomas Nowak Secretary General EHPA thomas.nowak@ehpa.org +49 176 6320 1140

European Heat Pump Association (EHPA)

- 125 members from 22 countries (status 05/2018)
 - Heat pump manufacturers
 - Component manufacturers
 - National associations
 - Consultants
 - Research & test institutes
- EU-wide representative of heat pump industry
- Registered in Brussels

EHPA represents the majority of players in the EU heat pump industry!

Talking about heat pumps in Europe means ...

- Heating
- Cooling
- Hot water
- For all cold, average, warm climates
- Residential
- Commercial
- Industrial applications
- Alone or in combination (hybrid)

market growth '05 – '17 | HP stock²⁰¹⁷: 10.5 mill. installed

*For some definitions of heat pumps the energy source is unknown (e.g. district heating). Those are omitted here.

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Heat pumps: key technology to achieving Europes energy & climate goals | Thomas Nowak | SEAD policy exchange | 4.10.18

New 2030 political targets

Renewable energy (binding)

32%

Annual increase heating / cooling

renewable and waste energy

Energy performance of buildings

- "buildings as active nodes in the energy grid"
- Requests MS to set up a long term
 renovation strategy

Energy Efficiency (indicative)

Annual decrease of final energy

2.1

Implementation will benefit heat pump technology

Energy Performance of Buildings Directive

Achievements

- "A highly energy efficient and decarbonised building stock by 2050" mentioned as objective (new art. 2a)
- Reference kept to "high-efficiency alternative systems" (art. 6&7)
- Direct contact established with relevant EC officials

- Heating&cooling in long-term renovation strategies (new art.2a)
- Referring to Ecodesign for promotion (art. 6&7) and financial aid (art. 10 § 6)
- "Weighting factors" as an alternative for MS to "primary energy factors" (Annex I - point 2 – 2)
- Additional indicators for buildings (CO2, etc.) (Annex I point 2 3)

Renewable Energy Directive

Achievements

- Renewable cooling not politically defined in the Directive (art. 7 § 3)
- "MS shall prioritise BAT where appropriate" (art. 23)
- Non-binding target of yearly pp increase in renewable H&C (art. 23)
- Higher overall RES targets (32%) than initial EC proposal (art.1)
- Right to renewable self-consumption (art. 21)
- Direct contact established with relevant EC officials

- Definitions of "ambient" (art. 2b) & "waste energy" (art. 2y) (and role of HP)
- Provision on "Exhaust air" (art. 2b) and impact on exhaust air HP
- Promotion of IC-HP in order to meet targets + calculation their RES share
- Definition & calculation methodology of "renewable cooling" (art. 7 § 3) Heat pumps: key technology to achieving Europes energy & climate goals | Thomas Nowak | SEAD policy exchange 3) | 4.10.18

Energy Efficiency Directive

Achievements

- New European default PEF of 2.1 (revisable every 4 years) (Annex IV)
- Higher overall EE targets (32.5%) than initial EC proposal (art.1)
- Direct contact established with relevant EC officials

- Use of new PEF (Annex IV) in Ecodesign
- Promotion of IC-HP in order to meet targets + calculation their RES share
- Recognition of savings from systems covered by Ecodesign (Annex V 2 (b))

Energy Union Governance Regulation

Achievements

- Objective of highly energy efficient and highly renewables-based energy system within the Union (art. 14 a.)
- H&C mentioned in provision in long-term strategies (art. 14 b.)
- DR and storage part o integrated plans

- HP-friendly integrated (EPBD/EED/RED) plans for 2030 at national level
- HP-friendly 2050 long-term strategies

Electricity Market Design

- Flexible electricity market (suitable to right to self-consume)
- Promotion of DR and storage
- Sector-coupling

What if Norway was really everywhere? Is the HP value chain ready for a mass market?

- Solutions for the renovation sector, multi-family buildings, industrial applications, district energy
- Solutions for sector coupling
- Manufacturing capacity and availability of components (including F-gas)?
- Knowledgable planners and architects?
- Installation capacity?
- Building codes?
- Financing and business models

A 100% renewable society is possible – by 2050 Join us at www.decarbheat.eu

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Discussion

CLEAN ENERGY

Energy Efficiency Cooperation

Accelerating Transition to Clean Energy Technologies

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Guiding Questions

- What are the major barriers to promoting high-efficiency heating systems and cold-climate heat pumps? How should governments and industry address these challenges and what types of resources or assistance are required?
- What policies and policy mechanisms can be effective in overcoming these barriers?
- What are effective economic incentives that can drive wider adoption of low/zero carbon heat pumps?
- Is there an opportunity or appetite for collaboration? Between regions, countries, or governments, industry and civil society? What could collaboration involve?
- Is there a need for additional research? Who is best placed to do this research? SEAD? Others?
- Could a collaborative campaign help drive the transition to efficient heating? What would this look like?

Closing Remarks

- Key takeaways
- Possible collaboration opportunities
- Feel free to follow up with CLASP or the speakers if you have any additional questions or thoughts
- All materials will be made available online
- Thank you for your participation!

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Governments Working Together to Save Energy.

For more information or follow up questions please contact:

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The presentations and discussion summary will be posted on the SEAD website, along with a recording of the webinar

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