

Progress report on INTERACT project

Michel van der Pal

Contents








- My background
- What is the interact project?
- What progress has been made?
- A few words about my 'regular' employer

Michel van der Pal

- MSc in Chemistry (desorption of organic compounds from sediments) at University of Utrecht, the Netherlands
- PhD in Built Environment (transport of radon in porous materials) at Eindhoven University, the Netherlands
- Postdoc in New Zealand: drying of aggregate materials using heat pumps
- Regular position: Researcher/Project manager at ECN (2007 - ...)
 - Working in group Thermal Systems, part of Energy Efficiency in Industry program
 - Active in:
 - Thermochemical heat transformers based on ammonia-salt reactions
 - Energy efficient drying using heat pumps and (ab)sorption technology
 - Consultancy on Energy Efficiency in industrial processes
- Temporary position: Marie Curie Research Fellow at University of Warwick (July 2015 – June 2016)
 - Execution of the Marie Curie project ‘Interact’

What is a Marie Curie project?

- *Marie Skłodowska-Curie* actions are European research grants for scientists in Europe and abroad...

Who applies for the fellowship?			
	Host applies	Individuals apply with an organisation	Funder applies
You have less than 4 years¹ research experience (e.g. you are doing your PhD) (Early stage researcher)	<ul style="list-style-type: none"> • Innovative Training Networks (ITN)  • Research and Innovation Staff Exchange (RISE)  		<ul style="list-style-type: none"> • Co-funding of regional, national and international programmes (COFUND) 
You have more than 4 years research experience or you have a doctoral degree (PhD)	<ul style="list-style-type: none"> • Research and Innovation Staff Exchange (RISE)  	<ul style="list-style-type: none"> • Individual Fellowships (IF)  	<ul style="list-style-type: none"> • Co-funding of regional, national and international programmes (COFUND) 
Managerial and technical staff	<ul style="list-style-type: none"> • Research and Innovation Staff Exchange (RISE)  		

Marie Curie project: interact

- **WP1: Development of high power density sorption reactors**
 - Based on ammonia-salt reactions
 - Test 10 kW-scale reactor in new test-rig University of Warwick
 - Heat pump and/or heat transformer application
 - Goal: 1 MW/m³
- **WP2: Strategic Market Development**
 - Interaction with stakeholders, e.g. Spirax-Sarco
 - Education on 'market' side (MBA modules at WBS)
 - Write strategic market development plan
- **WP3: Networking & Dissemination**
 - Contribute to i-STUTE and IEA-Annex 43 meetings
 - Write papers & visit conferences
 - Write personal development plan

Interact planning & progress

Month	1	2	3	4	5	6	7	8	9	10	11	12
Work package 1: Research and Development												
1.1 Reactor design and construction	█	█	█	█	█							
1.2 Reactor testing and characterization					█	█	█	█	█			
1.3 Analysis and writing final report										█	█	█
Work package 2: Strategic Market development												
2.1 Visiting companies			█			█			█			█
2.2 Attending Global Energy MBA courses		█	█	█				█	█	█		
2.3 Developing Strategic market plan										█	█	█
Work package 3: Maximize impact												
3.1 Networking at i-STUTE and IEA-HPC Annex 43	█	█	█	█	█	█	█	█	█	█	█	█
3.2 Conducting Dissemination	█	█	█	█	█	█	█	█	█	█	█	█
3.3 Writing personal development plan					█	█	█					
Deliverables												
D1.1 Sorbent reactor					█							
D1.2 Validated model calculation tool									█			
D1.3 Final report												█
D2 Strategic market plan											█	
D3 Personal development plan							█					
Milestones												
M1: Reactor designed and constructed					█							
M2: Characterization and optimization completed										█		

Overall conclusions

- Slightly ahead of schedule with dissemination activities such as presentations, papers and workshops
- Slightly delayed in reactor design & construction – might make measurements schedule quite tight
- Other activities according to schedule

What is ECN?

Not-for-a-profit organization

Founded in 1955

550 Employees ECN

€80M annual turnover

20 patents a year

5 Commercial licensing deals p/y

Mission:

...To develop knowledge and technologies that enable a transition to more sustainable energy systems...



ECN Focus Areas



Solar energy



Biomass



Policy studies



Energy efficiency

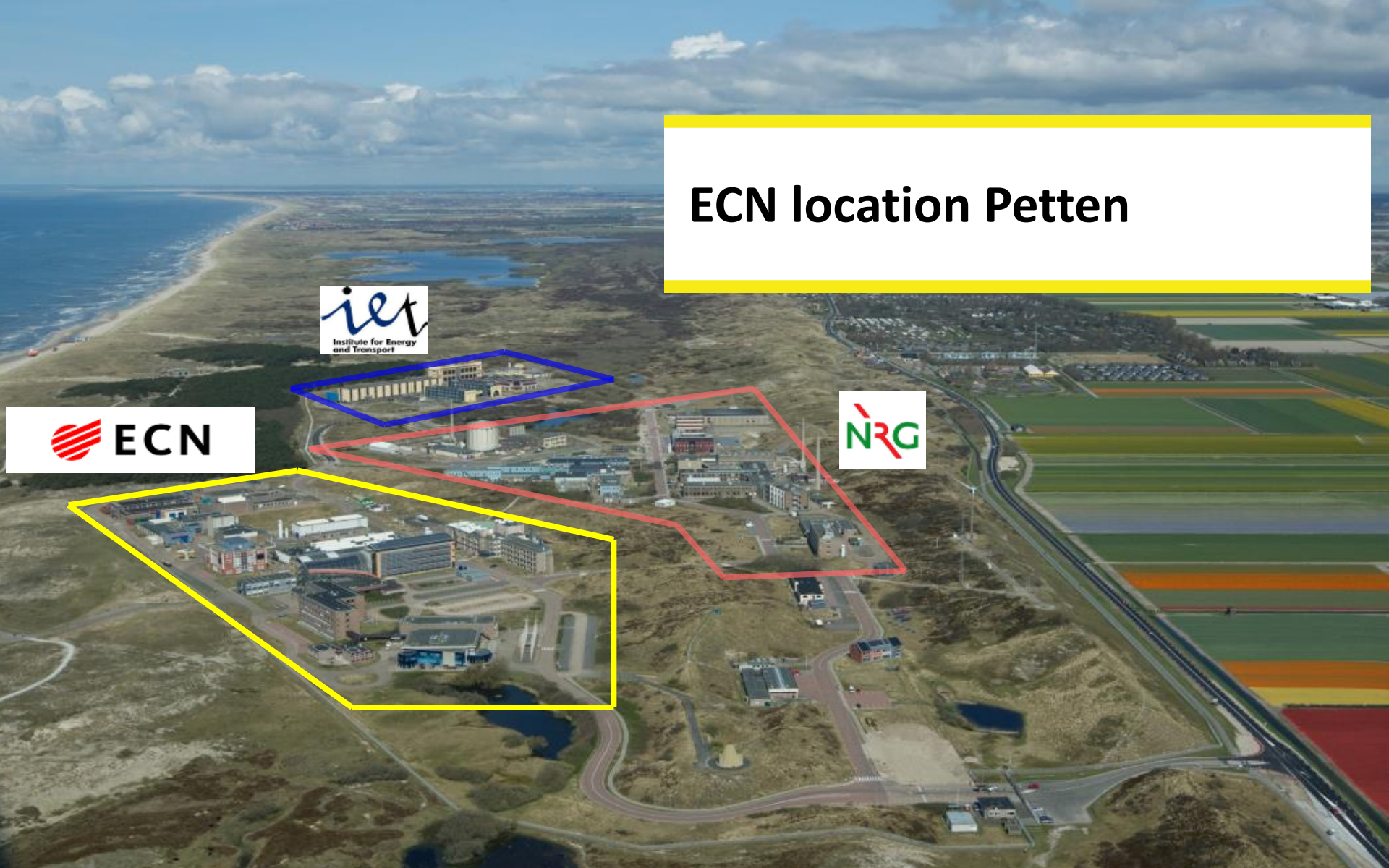


Wind energy



Environment & Energy engineering

ECN location Petten



ECN research activities
Industrial Heat technology



Brief overview of research activities

- **Thermo-chemical heat transformer development**
 - Based on ammonia-salt reaction, 10 kW-scale system designed, looking for opportunities to acquire project in which the system can be built
 - (ab)sorption-based drying system for re-use of latent heat in waste air flow
 - Cooperating with SME on development of absorption based thermal transformer
- **PCM-based thermal storage**
 - Demonstration of 2 m³ PCM heat storage, range 100-250°C
- **New working media for compression heat pumps**
 - 200 kW installation at paper mill for upgrade from 60 to 120°C with COP > 4.0
 - Follow-up project aims at increasing temperature range, power output and COP
- **Thermo-acoustic heat pump development**
 - Waste heat-driven heat transformer system at 10 kW-scale
 - Piston-driven thermo-acoustic system at 10 kW-scale
- **District heating & geothermal**
 - Various projects, most focus on industrial waste heat



Thank you for your attention