

Both₂nia

Põhjala vesiniku koostöövõrgustik

Ain Laidoja | Eesti Vesinikuühing

BothH2nia's twitter: [@both2nia](https://twitter.com/both2nia)

RuH2nu

Eesti osa Põhjala vesiniku “BotH2nia” koostöövõrgustikust

Let's talk about energy storage

Päike ja Tuul

Taastuvenergia ressursid Eestis

Ressursi on piisavalt aga oleme neto
elektri-importija riik



Foto: Kaarel Kaisal

Vaade homsesse

Me ei karda mõelda suurelt

Off-Shore Wind 2 Hydrogen Feasibility Study:

Off-Shore H2 production

Potential 7 GW wind installations

Hydrogen On-Shore terminal

NordStream

Hydrogen pipeline

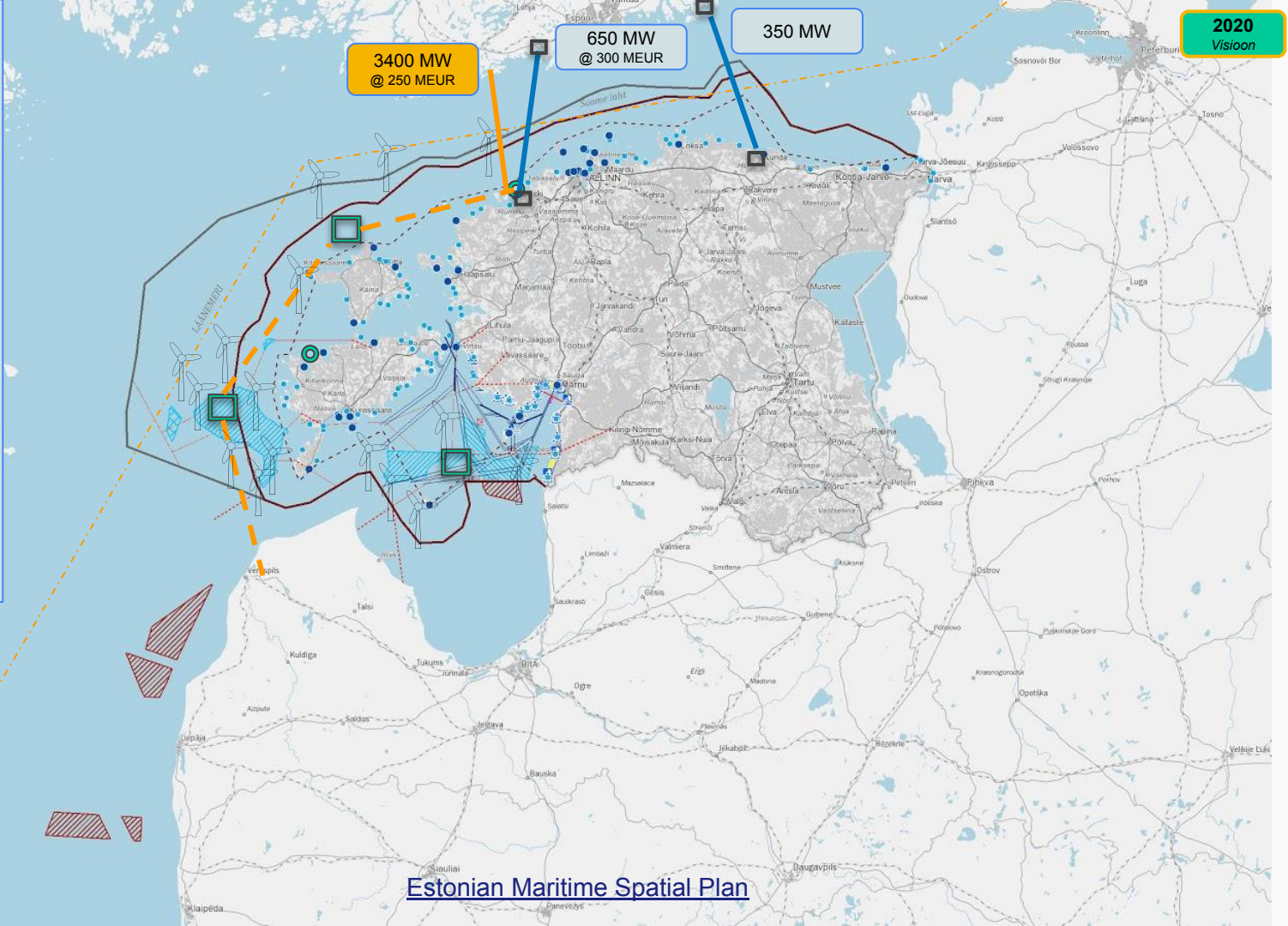
High Voltage DC Cables

HV AC/DC Converters

Development plans of Off-Shore wind parks

1100 MW
1000 MW
400 MW
400 MW
600 MW
7800 MW
1650 MW

Total 13 GW / 45 TWh_e/a





Arendusprojektid

Home > Arendusprojektid

Arenduspiirkond	Ettevõte	Tuulikute arv	Võimsus	Projekti algus
Hilumaa	Enefit Green AS (endine Nelja Energia)	160	1100 MW	2006
Liivi laht	Eesti Energia	160	1000 MW	2009
Neugrundī madalik	Neugrund OÜ	40	380 MW	2010
Liivi laht	Tuuletraal	76	380 MW	2013
Liivi laht	Five Find Energy	1	4 MW	2011
Saaremaa	Saare Wind Energy	100	600 MW	2015
Saare-Liivi ja Sõrve	Utilitas	800	7800 MW	2020
Saaremaa läänerannik	Sunly	169	1644 MW	2020
	KOKKU	1430	12908 MW	

New countries on the maps

Finland, Sweden & Estonia

2040

GASGRID

NORDION ENERGI

elering

Regional perspective

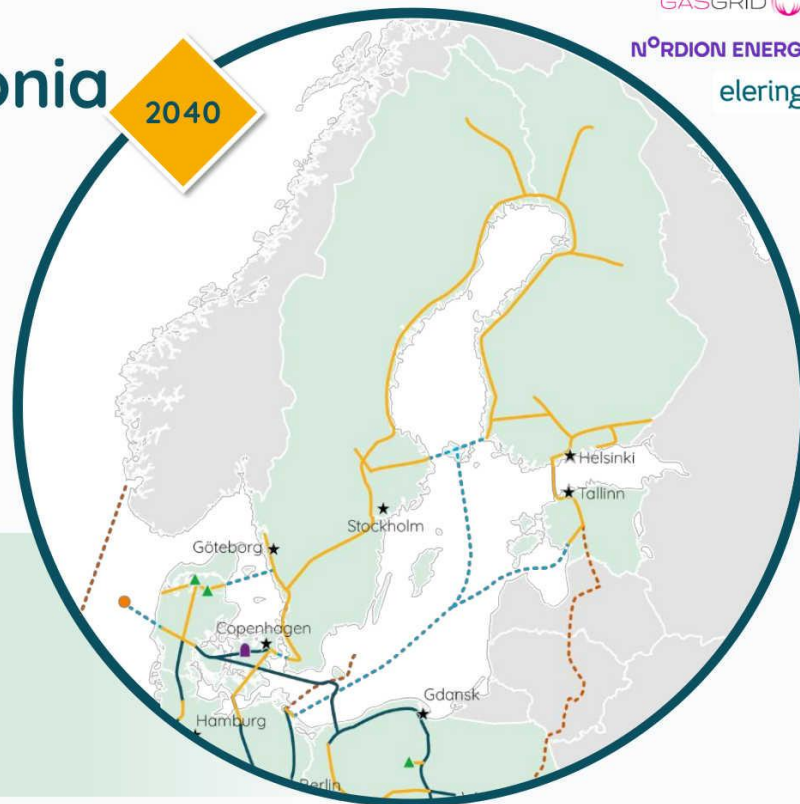
- In the Nordics and Baltics a significant new hydrogen infrastructure is proposed
 - Network potentially enabling more extensive utilization of clean energy sources and providing important connections between hydrogen and energy production and demand
 - Hydrogen from the Nordics could eventually also be exported into the rest of Europe
 - The development would benefit from excellent onshore wind conditions along the coast of the Gulf of Bothnia, and from the Baltic sea offshore wind potential.

2040

Finland: The hydrogen network could possibly develop further, and possible second north south connection might be developed

Sweden: Two interconnections with Denmark provide security of supply access to storage and the German market

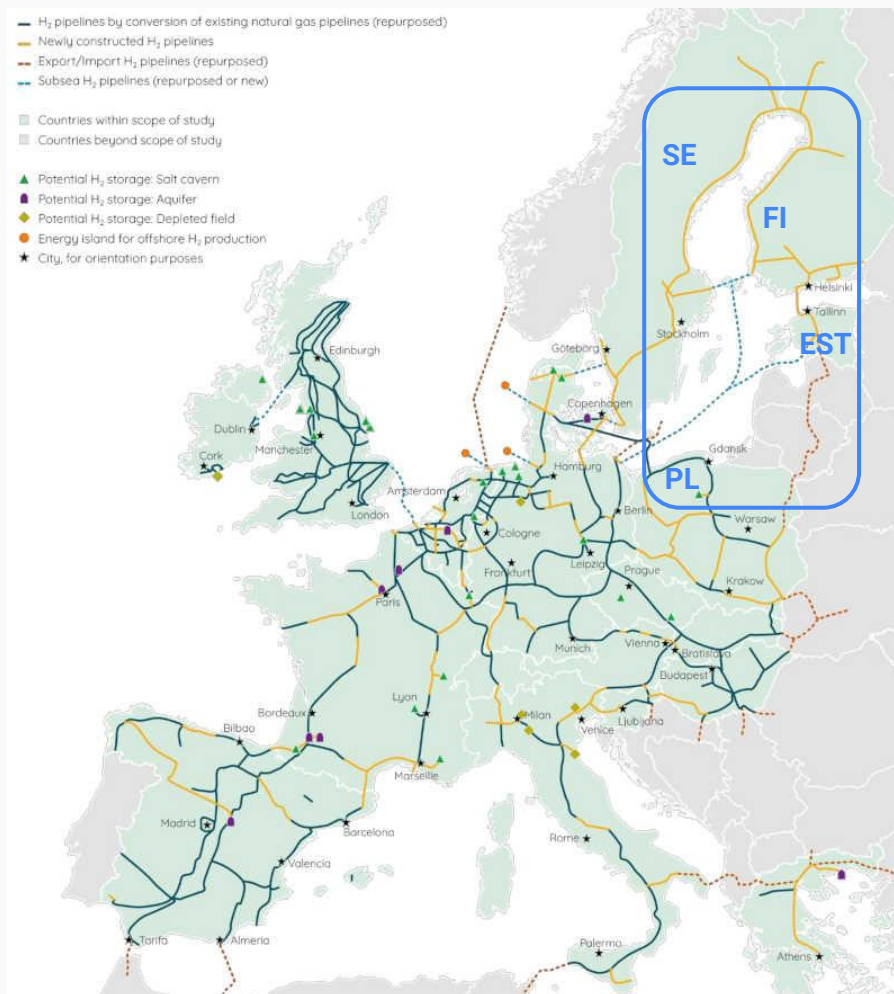
Estonia: Second route to rest of (eastern) Europe emerges through Baltic states into Poland



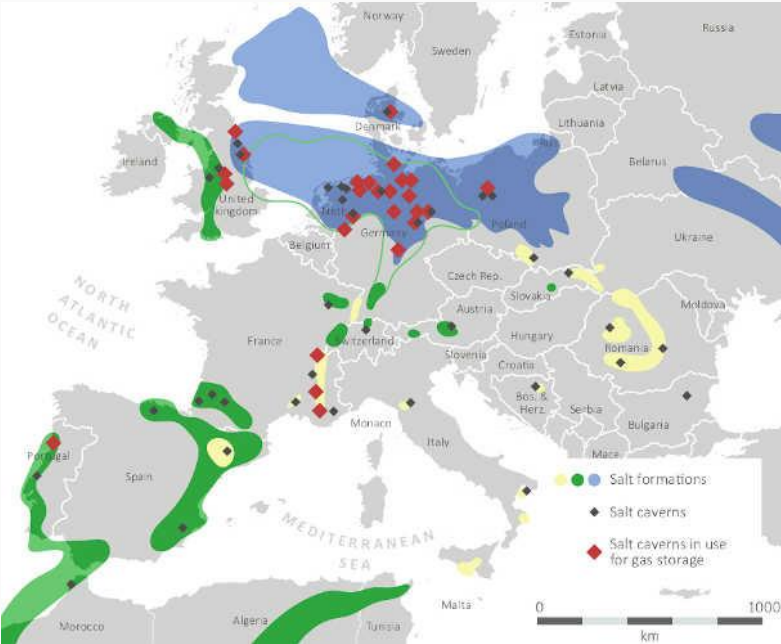
Võimalused

- Toruühendus meretuulele
- Salvestamine / Soolakoopad
- Gaasivõrgu dekarboniseerimine
- #BSRHN ühine koostöö
- Paldiski Sadam ja tööstusküla
- Hydrogen Bunkering
- Võimalus päikesele

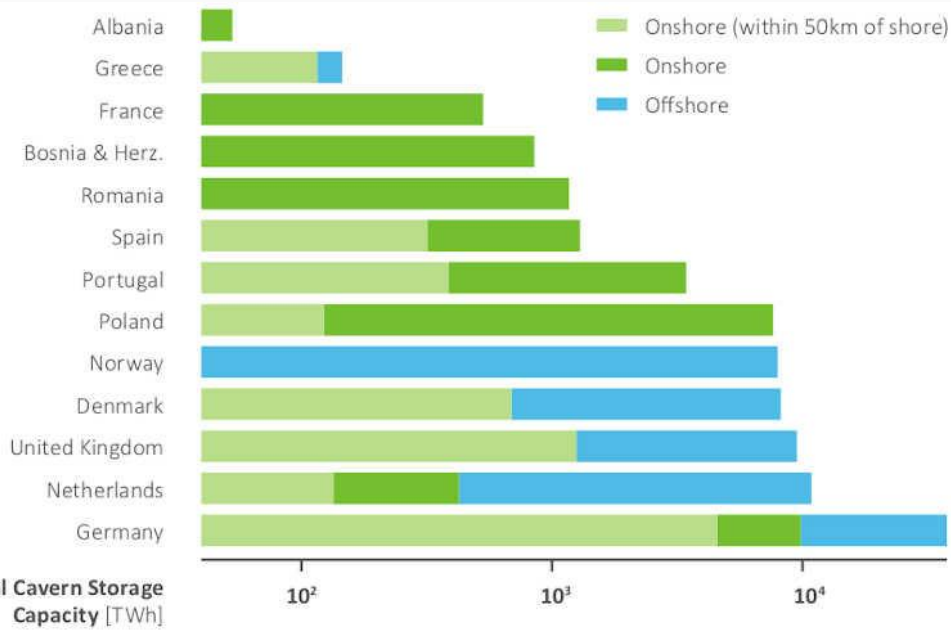
- ❖ Vesinik kui börsikaup
 - Nordpool Elekter
 - Get Baltic Maagaas
 - NordH2 Vesinik
- ❖ Taskukohase hinnaga
- ❖ Kättesaadav kõigile



Salt Caverns in Europe



Total Cavern Storage Capacity [TWh]



Hydrogen Storage in Europe

	Gaseous state				Liquid state			Solid state
	Salt caverns	Depleted gas fields	Rock caverns	Pressurized containers	Liquid hydrogen	Ammonia	LOHCs	Metal hydrides
Main usage (volume and cycling)	Large volumes, months-weeks	Large volumes, seasonal	Medium volumes, months-weeks	Small volumes, daily	Small - medium volumes, days-weeks	Large volumes, months-weeks	Large volumes, months-weeks	Small volumes, days-weeks
Benchmark LCOS (\$/kg) ¹	\$0.23	\$1.90	\$0.71	\$0.19	\$4.57	\$2.83	\$4.50	Not evaluated
Possible future LCOS ¹	\$0.11	\$1.07	\$0.23	\$0.17	\$0.95	\$0.87	\$1.86	Not evaluated
Geographical availability	Limited	Limited	Limited	Not limited	Not limited	Not limited	Not limited	Not limited

Source: BloombergNEF. Note: ¹ Benchmark levelized cost of storage (LCOS) at the highest reasonable cycling rate (see detailed research for details). LOHC – liquid organic hydrogen carrier.

Kust vesinik tuleb ja kuhu läheb

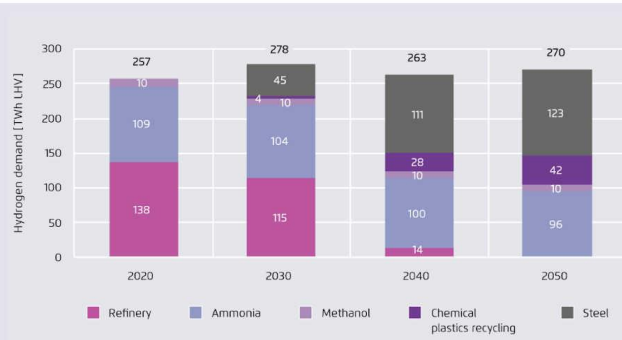
Eestist saab energiat eksportiv riik

Miks nüüd ja kohe ka Eesti

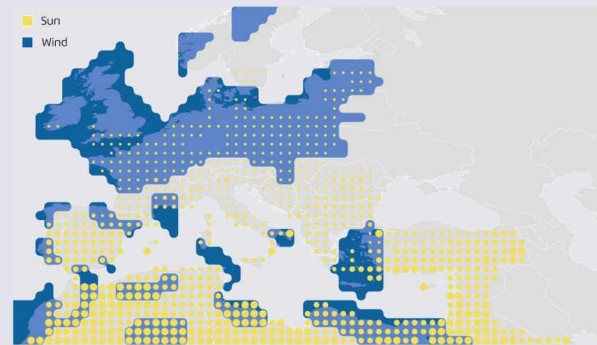
- Osa suurest merevõrgust
 - Turg kaubale Euroopas
 - Konkurentsivõimelise hinnaga energia/chemical feedstock edastamine
- **Sesoonne salvestus**, taastuv #varustuskindlus
- Meretuuleparkide rajamise / **ühendamise lahendus**
- Uued tööstusettevõtted ja #energiajulgeolek
- Eestist saab taas neto energia eksportija
- **Ligipääs Euroopale** (kesk-Euroopa suur nõudlus)
- Võimalus 2030+ tekkiv energia ületootmine **väärindada**

Vesiniku kasutus 2050 Euroopas

Industrial hydrogen demand from 2020 to 2050 in TWh per year



Solar and wind potential in Europe and the MENA region



Industrial hydrogen demand projected for 2050 in TWh per year



- Rafineerimistehased kaotavad turuosa
- Kasvad keemia/plastik
- Terasetööstus major player

- Meil on tuul
- Päikest aitab Both₂nia
- Lõunamaiseks konkurendiks on särav päike

- Tarbimine on Kesk-Euroopas

Miks nüüd ja kohe Soome, Rootsi ja Poola

Pakkumine Euroopale

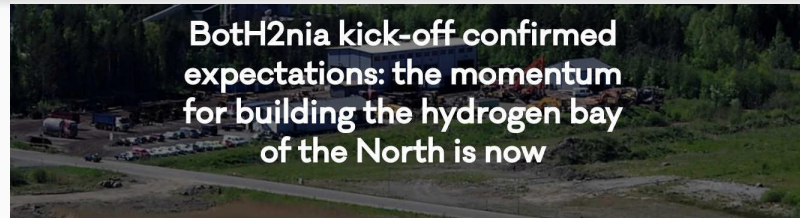
- Meil on vesinik ja toome selle teile kohale

või

Meil on vesinik ja teeme siia tööstuse

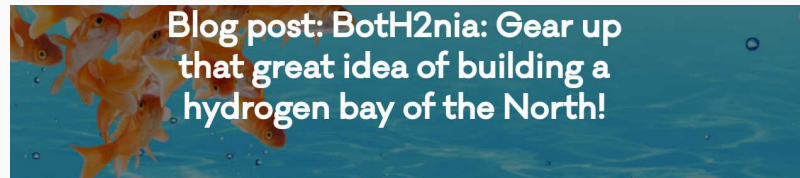
And there is now money to spend...

- Germany looking to invest 7+2 billion € on green hydrogen by 2030
- Netherlands has a 9 billion € “hydrogen valley” program
- Portugal 7 billion € h2 plans until 2030
- France 7 billion € hydrogen program
 - Looking to link with Germany
 - Overall investments into green energy policies around 100 billion € by 2030
- Hydrogen Europe estimates spending needs by 2030
 - Electrolysers 26,2 billion €
 - Off-shore wind 44,7 billion €
 - On-shore wind 37 billion €
 - Solar PV 28,2 billion €
 - Existing H2 production with carbon capture storage / utilization 20 billion €
 - Coal gasification with CCSU (Poland, Hungary, Romania and Bulgaria specific) 12 billion €



BothH2nia kick-off confirmed expectations: the momentum for building the hydrogen bay of the North is now

Today's BothH2nia-webinar, held as the national kick-off in Finnish, attracted around 200 participants. Sixteen speakers gave concrete presentations about how they are tackling the question of building the hydrogen bay of the North. With their presentations, they already started the dialogue now needed. In other words, BothH2nia was born.

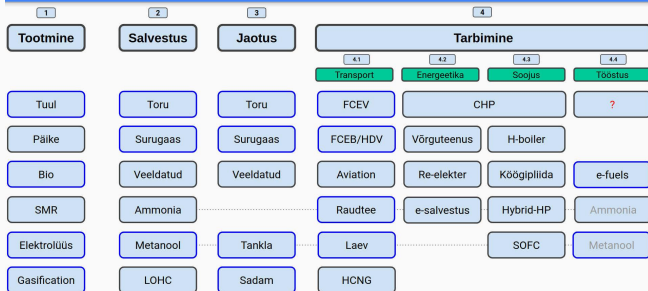


Blog post: BothH2nia: Gear up that great idea of building a hydrogen bay of the North!

Recently we heard that Neste, one of the central hydrogen actors in Finland, decided to invest in Rotterdam instead of Finland, largely because of the existing hydrogen infrastructure there. For the emerging ecosystem of Green Electrification, it is a clear sign to start making changes that matter for the next investment decisions to come.

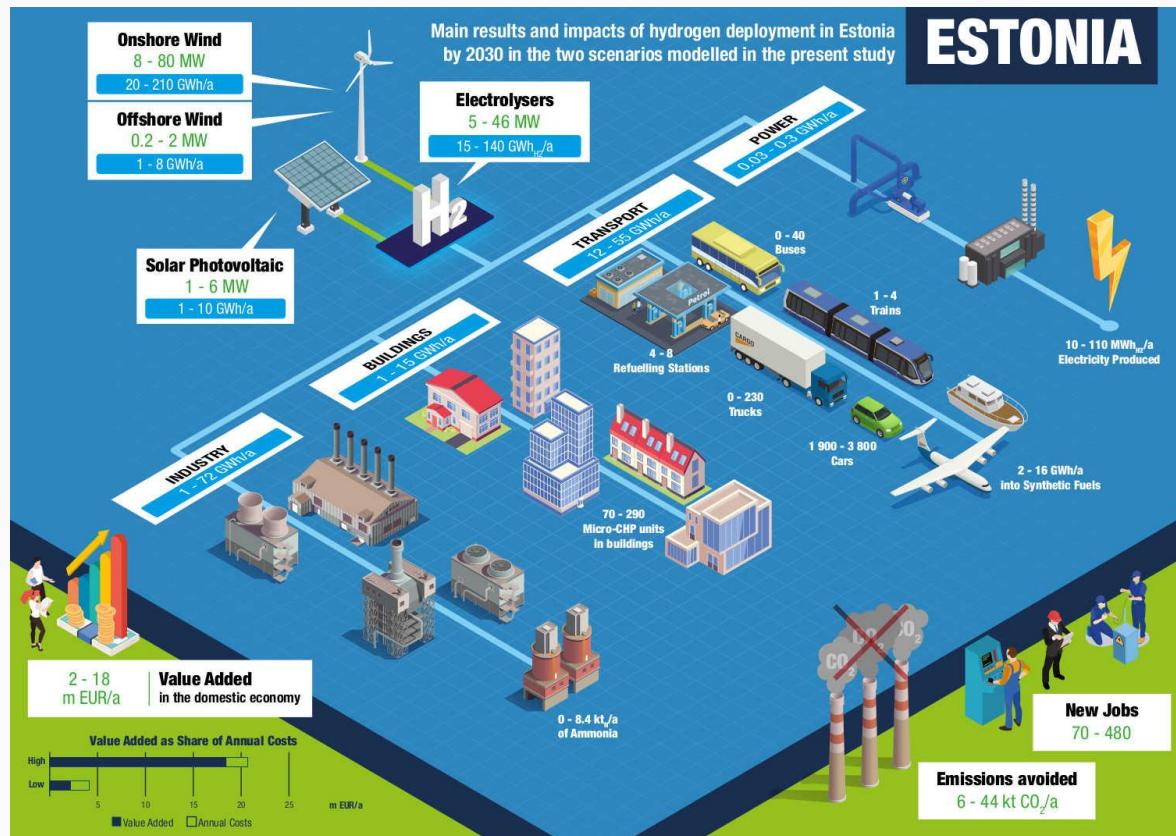
Eesti Vesiniku LEGO

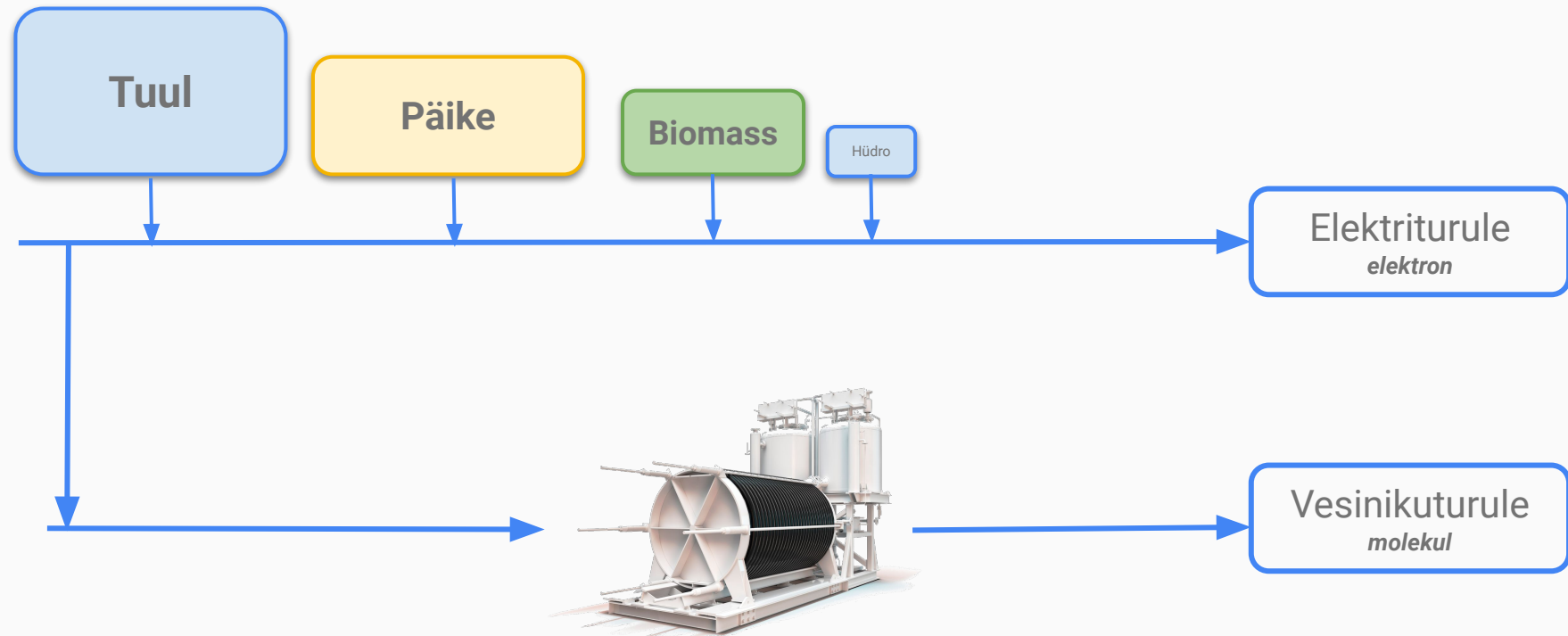
Vesinik tootmisest kasutamiseni



12

- Tõstame klotsid ümber
- Teeme selgeks ühikud
- Kirjutame numbrid
- Defineerimine uued tööstused
- Kirjutame Eesti EU vesinikukaardile





Stakeholders ja selgelt defineeritud eesmärgid

Stakeholders

Igal Stakeholderil peab olema oma huvi ja kasu!

Igal huvigrupil oma eestvedaja

Kuna meil tööstust pole, kes võiks olla tööstuse eestvedaja-visionäär



Timeline

Igal asjal oma aeg!



Meil on vajalik Eesti Vesiniku
Strateegia ja selgelt sõnastatud
eesmärgid koos ajakavaga, millele
toetuda.



Esimene etapp:

- Tuulepargid 8 BEUR
- Vesinikutööstus 3 BEUR
- Dedicated hydrogen pipeline 0.25 BEUR + connections Total max 1 BEUR
- Kokku vesiniku tootmisvõimekusse **12 miljardit eurot.**

Teine etapp: lisanduvad tööstusinvesteeringud

- e-chemicals/fuel Industry
- Sadam + Laevastik + Bunkering - 600-700M

Kuidas edasi

- Viitame ühiselt kokkulepitud brändinimele
- Kõik asjast huvitatud kaasatud
 - Ettevõtted
 - Linnad ja KOV'id
 - Teadus / Ülikool / Akadeemia
 - Finantsasutused
 - Riik - Ministeeriumid - majandus, kliima, keskkond, rahandus
 - Ühingud, assotsiatsioonid, klastrid

Kutse arutelule

10. Mai 2021 10:00

Kontakt: Ain Laidoja mob: 5017615 vesinik@h2est.ee

Operating Model and Work Groups 2021

Steering Group – chair Outi Ervasti, Neste

Cluster meetings – 30 companies and industry associations

- Common interests, focus areas, working groups, financials
- Stakeholder group and collaboration meetings

How will Finland differentiate

Simo Säynevirta, ABB

- System level energy efficiency optimisation
- Competitive solutions and capabilities
- Value networks, collaborations, IPCEI

Innovation and investment projects

Sakari Kallo, SSAB

- Summary of Hydrogen projects in Finland
- Linkage to EU Hydrogen IPCEI projects
- R&D and investment financing
- Recovery Package

EU-networking

Matti Malkamäki,
Aurelia Turbines

- ECH2A Roundtables
- Hydrogen IPCEI preparations at EU-level
- Both2nia - project
- EU-affairs and information sharing

Operating environment and regulation

Olli Sipilä, Gasgrid

- Combined view from the cluster company
- Evaluation on impacts of the coming regulation and taxation
- Cluster statements

Secretariat