CleanPower Turbinator®

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Content

- CleanPower AS background
- The Turbinator®
- Projects
**Established 2005 in Kristiansund, Norway**

**Spin-off from shipbuilding industry**

**Thruster technology**

(Permanent Magnet based)

**Hydropower turbine generator (also PM)**

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**Brunvoll and Inpower:**
- Rim-driven thruster (PM motor)
- Pilot installation on ferry «Eiksund»

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**CleanPower turbine**
- Prototype test facility in Kristiansund, Norway
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The Turbinator®

- Axial flow turbine
- Fixed runner blade pitch
- Adjustable guide vanes
→ Single regulated Kaplan
- Integrated PM generator

Power 100 to 3000 kW
Head 15 - 180 ft
Flow 18 - 350 cfs
Efficiency 80 - 85%
(turbine + generator)
Typical installation main components

- Main valve
- Intake pipe
- Turbinator
- Draft tube
- Plant control system
Flange / flange installation

1...

2...

3...!

Simplified machinery
Simplified civil works
Short time to market
...and low LCOE (Levelized Cost Of Energy)
**Applications**

- Compact construction
- Well suited for hydropower energy recovery in existing infrastructure
  - Water supply
  - Irrigation systems
  - Hydropower plant environmental flows
- EEA grants program: *Component 1*
Example: Environmental flow
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Pilot installation Hegset dam

- Environmental release
- Five month season: May - Sep
- Net head         24   m
- Flow             1.2  m³/s
- Installed power  280  kW
- Seasonal production  0.8  GWh

Before: 0 kW

After: 230 kW
Fully remote controlled

Hegsetdammen Minikraftverk

CleanPower TURBINATOR \(^{(R)}\) 660-750

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PRODUKSJON

- Energi (total): 0,742 GWh
- Driftstid: 5120,0 timer
- Cos fi: 1,0
- Nettspanning: 430,3 V
- Generatorstrøm: 314,8 A
- Ledeapparat: 53,1 %

Hovedventil: Åpen
Generatorbryter: INNE

- Driftsmodus: AUTO

237 kW
Tjeldbergodden power plant

• Energy recovery from methanol plant cooling water pumps

• Total project cost: EUR 1,5 million

• Annual production around 3 GWh
'45 Mile' project

- CleanPower will deliver three 1 MW Turbinators for the project '45 mile Hydro' on an irrigation canal in Oregon, USA
- The project receives 1.5 million USD grants from DoI / DoE
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