specific heat ratio γ = 1.32.

specific heat at constant pressure Cp = 80J/molK.

for isentropic expansion 3-4 relation between temperature and pressure can be given as :

Since the flow is also isentropic,

$$\frac{p_2}{p_1} = \left(\frac{T_2}{T_1}\right)^{\frac{\gamma-1}{\gamma}}$$

T3=333K, P3=25 Bar, P4=4Bar.

solving gives, T4= 213.56K(outlet temperature).

power output =6*10^9 watt

net power output = turbine power - pump power.

power difference can be written in the form of enthalpy change. m=mass flowrate.

=m*Cp*(T3-T4-T2+T1).

T4=T1(isothermal heat rejection)

6*10^9=m*Cp*(T3-T2)

Since no further information is given assuming pump work to be negligible.

6*10^9=m*Cp*(T3-T4)

6*10^9=m*80*(333-213.56)

=> m= 627930kg.

This has been cut and pasted, the last part should be in moles not Kg. as ammonia
Has molar mass of 17 grams per mole, the mass is grams = 106 x 10^5 gram
= 106 x 10^2 Kg = 10.6 Tonnes per second.

Would this answer, 10.6 tonnes per second be correct?

The exit temperature of – 60 at 4 atmospheres will be a liquid…can a turbine work when it's exhaust gas is a liquid? I am thinking turbine exhaust points downward into a vacuum chamber which collects liquid at base.