

Ardnacrusha Hydro-Electric Scheme

COUNTY CLARE



Ardnacrusha

Hydro-Electric Scheme

The hydro-electric development of the River Shannon was undertaken by the Irish Government in 1925 and on completion in 1929 was handed over to the Electricity Supply Board.

The River Shannon, approximately 214 miles long, is the longest Irish river. It flows through Lough Allen, Lough Ree and Lough Derg on its way to the sea near Limerick. It is a remarkably flat river, the only important fall occurring on the 15-mile stretch between Killaloe and Limerick.

A dam constructed on the river below Killaloe diverts the water into a head-race, about 8 miles long, which terminates at the Ardnacrusha power station. The head-race is designed for a discharge of 400 cubic metres per second. A tail-race, $1\frac{1}{2}$ miles long, returns the discharge from the power station to the river above Limerick.

Storage

The total storage in the Shannon river and lakes is approximately 600 million cubic metres. It takes the potential energy approx. of 15 tons of water at a head of 96 feet to keep a 1 kW electric fire heated for one hour.

The generating plant comprises three vertical-shaft Francis turbo-alternators (installed in 1929) and one vertical-shaft Kaplan turbo-alternator (installed in 1934) operating under an average head of 93 feet. Two small house turbines supply some of the station auxiliaries.

The 85,000 kilowatts of generating plant in Ardnacrusha was adequate to meet the electricity demand of the entire country in the early years. Sometimes during floods, water

had to be wasted because the total system demand, particularly at night-time, was so small. Thus, in the early 1930s the generated output from the station averaged only about 140 million units annually. As the country's demand for electricity increased, it became possible to avail of Ardnacrusha's full output and in recent years over 400 million units per annum have been generated.

Weir, O'Brien's Bridge

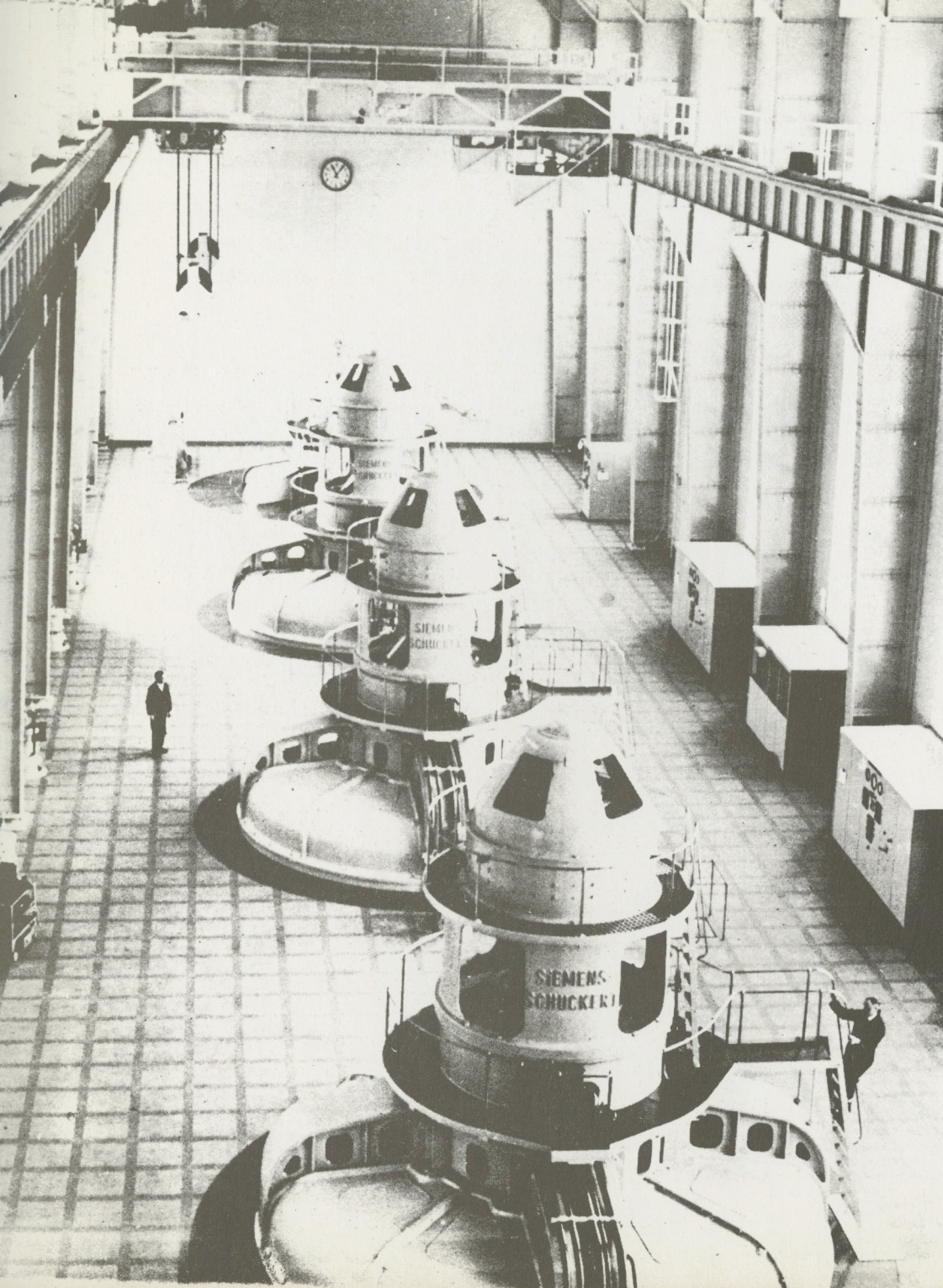
This controls the flow of water from the Shannon into both the Head Race and the old river bed. There are six sluice gates on the old river outlet, and three sluices and a navigation gate on the canal outlet. The average flow in the Shannon is about 200 tons per second. This can increase to over 900 tons during flood.

A minimum quantity of 6 tons per second must be allowed down the old river bed for fishery purposes.

In flood this quantity will be greatly increased if the extra water cannot be stored without danger of flooding the country upstream. A fish pass of 13 steps allows for the passage of fish from the river to the higher level above the Weir and so on upstream.

Since the station was constructed, many additions and alterations have been made to the transformers and switchgear in order to feed the additional 110,000 volt transmission lines and 38,000 volt distribution lines which now radiate from it. Thus, initially two transformers sufficed to feed the 38,000 volt lines; now five transformers are necessary.

As part of its programme to re-establish the Shannon as a major salmon river, the ESB built what is now the second largest fish hatchery in Europe at Parteen. Salmon and trout reared at this hatchery have been used to re-stock the Shannon and many other rivers.



TECHNICAL PARTICULARS

Catchment area 10,400 km² (4,020 sq. miles)
 Average annual rainfall 967 mm. (38 in.)
 Average annual flow 180.0 m³/sec. (6,865 cusecs)
 Storage capacity 250 x 10⁶m³ (4.4% of annual flow)
 Average head 28.3 m. (93 ft.)

Weir 4 double roller gates each 10 m. wide
 2 single roller gates each 18 m. wide
Head Race Length 12.8 km. Capacity 400 m³/sec.

Tail Race Length 2.4 km.

Turbines	1	2	3	4
Type	Francis	Francis	Francis	Kaplan
Rated H.P.	34,000	30,000	30,000	30,000
R.P.M.	150	150	150	167
Year com.	1929	1929	1929	1934
Maker	Escher Wyss	Voith	Voith	Voith

Alternators	1	2	3	4
Type		3 phase, 50 cycle		
Nor. rating	30,000 kVA	30,000 kVA	30,000 kVA	25,000 kVA
Power factor	0.7	0.7	0.7	0.9
Voltage	10,500	10,500	10,500	10,500
Maker	S.S.W.	S.S.W.	S.S.W.	S.S.W.

Transformers			
<i>Name</i>	<i>Maker</i>	<i>Capacity</i>	<i>Voltage Ratio</i>
T101, T102 and T103	S.S.W.	30,000 kVA	11,000/112,300
T104	S.S.W.	30,000 kVA	10,500/112,000
T141	A.E.G.	31,500 kVA	110,000/ 40,887
T41	A.S.E.A.	8,000 kVA	11,282/ 43,365
T42 and T43	S.S.W.	8,000 kVA	11,000/ 43,365
T44	S.S.W.	8,000 kVA	11,000/ 42,315
ST11 and ST12	A.E.G.	800 kVA	10,500/397
T104	S.S.W.	30,000 kVA	10,500/112,000

Arc Suppression Coils			
100 ASC	S.S.W.	120 A	—
40 ASC 1 & 40 ASC 2	A.S.E.A.	80 A	—

One of our many Stations

Of the 28 generating stations 9 are hydro, 4 operate on milled peat, 6 on sod peat, 1 on native coal, 6 on oil, 1 on sod/milled peat and 1 on coal or oil.

HYDRO STATIONS	<i>Capacity Mw.</i>	STEAM STATIONS	<i>Capacity Mw.</i>
River Shannon: Ardnacrusha	85	Portarlington (Co. Laois) <i>sod peat</i>	38
River Liffey: Pollaphuca	30	Tarbert Island (Co. Kerry) <i>oil</i>	120
Golden Falls	4		
Leixlip	4		
River Erne: Cathaleen's Fall	45	Allenwood (Co. Kildare) <i>sod peat</i>	40
Cliff	20		
River Lee: Inniscarra	19	Ferbane (Co. Offaly) <i>milled peat</i>	90
Carrigadrohid	8		
River Clady: Clady	4	Lanesborough (Co. Longford) <i>sod and milled peat</i>	60
	219	Rhode (Co. Offaly) <i>milled peat</i>	80

UNDER CONSTRUCTION

Pumped Storage Turlough Hill, Co. Wicklow	292
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STEAM STATIONS	<i>Capacity Mw.</i>		
Pigeon House "A" (Dublin City) <i>oil</i>	90	Arigna (Co. Roscommon) <i>native coal</i>	15
North Wall (Dublin City) <i>oil</i>	48	Miltown-Malbay (Co. Clare) <i>sod peat</i>	5
Ringsend (Dublin City) <i>coal/oil</i>	270	Screeb (Co. Galway) <i>sod peat</i>	5
Marina (Cork City) <i>oil</i>	120	Cahirciveen (Co. Kerry) <i>sod peat</i>	5
Pigeon House "B" <i>oil</i>	268	Gweedore (Co. Donegal) <i>sod peat</i>	5
Great Island (Co. Wexford) <i>oil</i>	120		1,459
		Total Capacity, Hydro and Steam	1,678 Mw.

Fish Hatchery, Parteen

