PRACTICAL EXAMPLES

- TREATMENT OF WATER FROM FIRST RAINS FOR STRETCHES OF ROADS, HIGHWAYS, SERVICE STATIONS, REST STOPS
- OIL AND GAS REFINERY SYSTEMS
- SYSTEMS OF LIQUEFACTION AND GASIFICATION
- CEMENT PRODUCTION SYSTEMS
- FARMING COMPANIES
- SALE, DISTRIBUTION AND STORAGE OF HYDROCARBONS
- PARKING LOTS AND TRANSIT AREAS
- CHEMICAL INDUSTRIES
- TANNING SYSTEMS

TAccording to the existing legislation, included under the category of industrial effluents, and therefore by law subject to proper treatment, are metereological run-off waters that "*run off on surfaces on which are deposited waste, raw materials, products... or on which processing or production has taken place, including loading and unloading,.. that carry the possibility of run-off of substances that are dangerous or have the potential to cause real environmental detriment*".
The system CEA planned, which, thanks to its flexibility and modularity is capable of adapting to the specific needs of the contracting customer, results in considerable savings both in terms of completion costs, adapting to the existing systems with minimal structural alterations therefore avoiding any costly revamping, and of costs related to the management of purification process, thanks to the ability of analytically characterizing the effluents which ensures that only the share of effluents really polluted shall be taken into consideration.

CEA, in collaboration with international industrial partners, has already planned and designed 50 systems, and completed 20 hydraulic devices.

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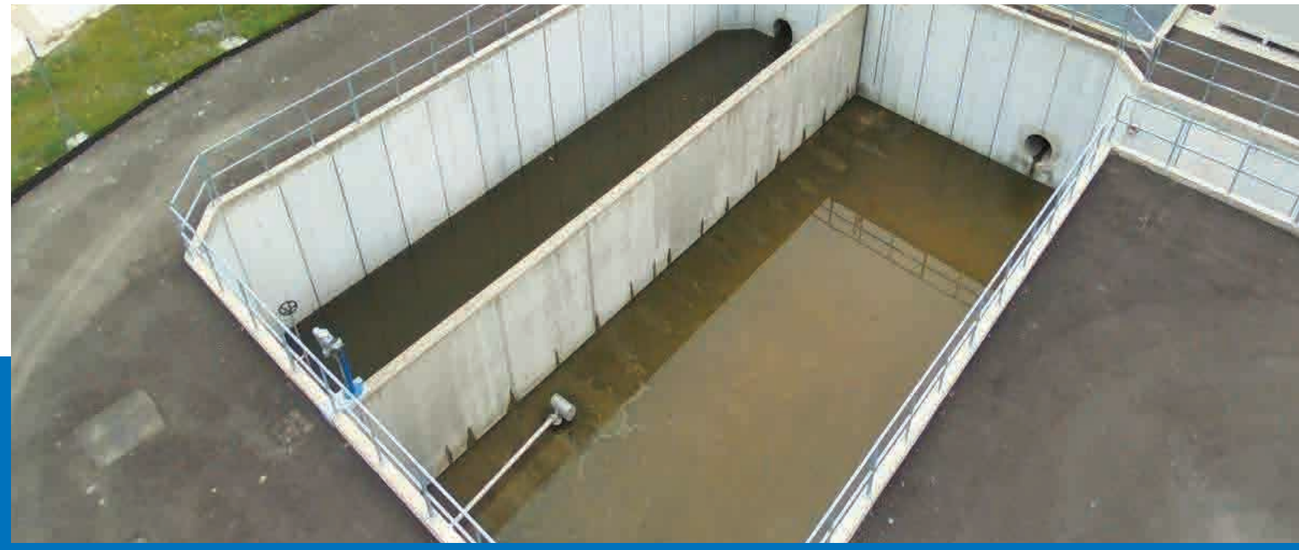
PURIFICATION

INTELLIGENT HYDRAULIC DEVICE FOR THE MANAGEMENT OF RUN-OFF WATER

FROM RAINWATER TO RUN-OFF WATER

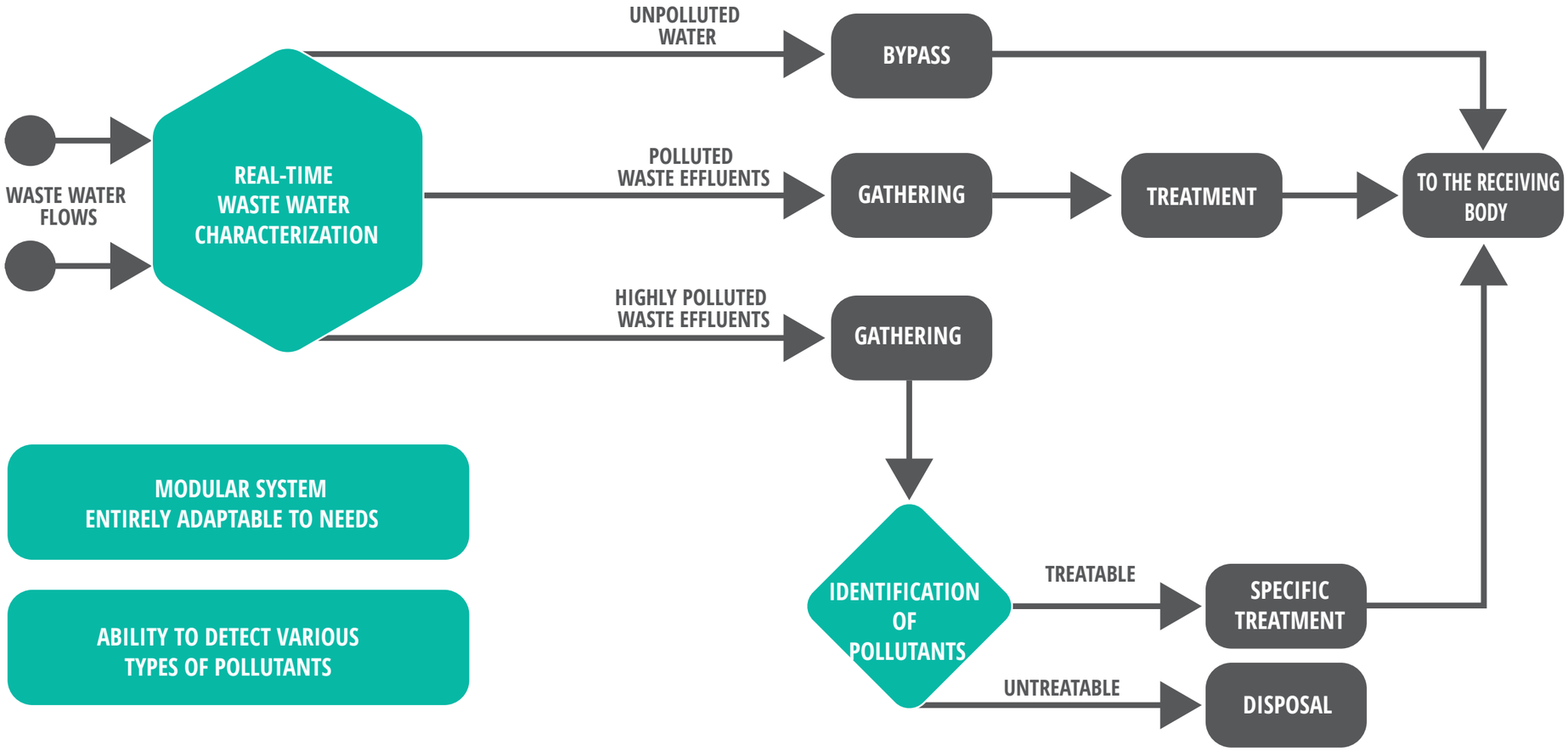
PROBLEMS OF WATER RUNOFF

In recent years the sector of water resource management has been defined by significant changes in perspective. An emblematic example is that of **rainwater** which, for long, has been summarily grouped in the category of **"clean water"**. The gradual involvement of European institutions in national politics and the emergence of new environmental sensibilities have led to more attention being given to the **types of pollution** deriving from **nonpoint sources**, acknowledging the need to reach a different level of control and management strategy for the pluvial event which, not permeating the subsoil, **flushes the draining surfaces**. Today, an ever-increasing amount of rainwater, flowing on impermeable or semi-impermeable surfaces, merges directly into surface-level bodies of water bringing with it large quantities of polluting agents. It is worth noting how the c**oncentration of pollutants** carried by the first surge of rain as part of a meteorological event **may even be superior** to those in wastewater deriving from sewers, containing **not insubstantial percentages** of substances such as metals and hydrocarbons. The Italian regulatory situation, which has a legislative guideline in the form of the law **D. lgs 152/2006**, was reformed by the **Supreme Court of Cassation (Cassazione) Sentence Number 2832** of the 22nd of January 2015 which, by limiting the definition of meteorological run-off water to a restricted meaning, at the same time broadened the definition of industrial water including in it meteorological run-off water that undergoes **contamination** by other polluting substances or materials.



THE CONTROL AND TREATMENT SYSTEM

The **great variability of environmental situation**s that are associated to the gathering of pollutants in the drainage network cause a **high variability**, from event to event, in the **qualitative** characteristics of the meteorological run-off water. This makes the implementation of an efficient control and treatment system **extremely difficult**. Traditional solutions that are grounded essentially on the measurement of quantitative parameters are marked by **deterministic management ideas, which are inadaptable** to those events characterized instead by a high level of randomness.



THE CEA SOLUTION

The solution patented by CEA is based on the **qualitative characterization of the entire pluvial event**, not limited to only the first flush. The main chemical-physical **parameters** of the run-off waters collected by the drainage system (conductivity, pH, suspended solids, presence of hydrocarbons) are **actively monitored in real-time** by means of an exclusive system of collection and a series of sensors and analyzers **prior to the entry of the water** into the storage and treatment basins. It is therefore possible to perform a **second characterization** in the accumulation basin capable of identifying the potential pollutant of those effluents which are particularly full thereby enacting a series of related processes, from the specific treatment needed to the disposal. These analytics are correlated to a highly scalable software architecture which has the ability to automatically handle **recurring or exceptional natural events** and identify the potential environmentally-dangerous accidental situations, enacting a series of routes and procedures aimed at minimizing their effects. The ability to reliably and continuously gauge the characteristics of the effluents allows us to efficiently manage **all run-off water** with a high degree of automation, not limited to only the run-offs induced by the first rains, and **this holds true irrespective of the type of system** used for water treatment.

MODULAR SYSTEM ENTIRELY ADAPTABLE TO NEEDS

ABILITY TO DETECT VARIOUS TYPES OF POLLUTANTS

ARCHITECTURE OF THE ANALYSIS AND MANAGEMENT SYSTEM

SENSORS AND ANALYZERS

At the root of the control and treatment process lies a system of analyzers and sensors capable of precisely and accurately distinguishing the characteristics of the liquid collected by the drainage system. The sensor system that identifies the various chemical-physical parameters works in conjunction to a multichannel transmitter capable of handling multiple parallel processes and interfacing with a remote controller to allow a remote control of all measurement instruments.
Analyzers and sensors, moreover, are connected to the management software of the PLC-housed system. The scalability of the software allows for the implementation of a system of analyzers and sensors with a high modularity therefore adaptable to the most diverse situations, which holds true both in the initial planning stage as well as in subsequent stages, without needing to re-plan and redesign the whole system architecture.

MANAGEMENT SOFTWARE

The management software housed in the PLC, connecting all signals deriving from the sensors and analyzers, is capable of distinguishing between recurring and exceptional events, enacting all the necessary measures to treat the effluents. The scalability of the software allows for the implementation of precise management protocols without costly revamping maneuvers.