CLAIMS

1. A method comprising:

determining, by a control system for a plurality of unmanned aerial vehicles (UAVs) that are available to provide item-transport service a first geographic area, UAV demand data indicating demand for item-transport services by the plurality of UAVs during a period of time in the first geographic area, wherein the demand data indicates demand for deployment of UAVs from a charging hub to pick up items from one or more source locations and transport the items to one or more target locations in the first geographic area;

determining, by the control system, battery state information for the plurality of UAVs that are available to provide item-transport service in the first geographic area, wherein the battery state information is based at least in part on individual battery state information for each of two or more of the UAVs;

based at least in part on (a) the demand data for item-transport services by the plurality of UAVs, and (b) the battery state information for the plurality of UAVs, determining respective charge-rate profiles for one or more of the UAVs; and

sending instructions to cause respective batteries of the one or more of the UAVs to be charged according to the respectively determined charge-rate profiles.

2. The method of claim 1, wherein the demand data indicates the demand during a given period of time.

3. The method of claim 1, wherein the plurality of UAVs serve the first geographic area, wherein a plurality of UAV charging hubs are distributed throughout the first geographic area, and wherein the demand data is indicative of demand on per-charging-hub basis.

4. The method of claim 1, wherein determining the demand data comprises:

determining expected tasks for the plurality of UAVs during the period of time; and

determining group-wide power requirements corresponding to the expected tasks.

5. The method of claim 1, wherein determining the one or more charge-rate profiles comprises:

determining expected tasks for the plurality of UAVs during the period of time; and

determining a schedule of operation for the plurality of UAVs to collectively carry out the expected tasks.

6. The method of claim 1, wherein determining the battery state information for the plurality of UAVs comprises:

for each of one or more of the UAVs, determining one or more of the following information items: a current battery level of the UAV, a number of charge cycles experienced by a battery of the UAV, an expected number of remaining charge cycles for the battery of the UAV, and a remaining useful life for the battery of the UAV.

7. The method of claim 1, wherein the demand data comprises power-consumption data for a set of UAV item-transport tasks, and wherein determining the charge-rate profiles comprises:

for each UAV from a subset of the plurality of UAVs, applying a cost function to evaluate cost of charging the UAV such that the UAV can perform one or more tasks from the set of tasks during the period of time; and

based on the cost evaluation for the subset of UAVs, selecting a set of one or more of the UAVs that are collectively capable of performing the set of tasks during the period of time.

8. The method of claim 1, wherein determining the demand data comprises:

when the demand data indicates a lower demand level during the time period, then assigning a lower charge-rate to one or more selected UAVs from the plurality of UAVs; and

when the demand data indicates a higher demand level during the time period, then assigning a higher charge-rate to the one or more selected UAVs.

9. The method of claim 1, further comprising:

based at least in part on the demand data, determining a cost per unit of UAV downtime during the period of time.

10. The method of claim 9, wherein determining the cost per unit of UAV downtime comprises:

determining a set of tasks for performance by the plurality of UAVs during the period of time;

determining a cumulative power consumption requirement for the plurality of UAVs to carry out the set of tasks; and

based at least in part on the cumulative power consumption requirement, determining a cost per unit of UAV downtime during the period of time, wherein time spent by a given UAV results in downtime for the given UAV.

11. A control system for a plurality of unmanned aerial vehicles (UAVs) comprising:

at least one communication interface for communicating with a plurality of charging hubs, wherein each charging hub is capable of charging one or more of a plurality of UAVs that are available to provide item-transport service a first geographic area; and

a computing system operable to:

determine UAV demand data indicating demand for item-transport services by the plurality of UAVs in the first geographic area, wherein the demand data indicates demand for deployment of UAVs from a charging hub to pick up items from one or more source locations and transport the items to one or more target locations in the first geographic area; determine battery state information for the plurality of UAVs that are available to provide item-transport service in the first geographic area, wherein the battery state information is based at least in part on individual battery state information for each of two or more of the UAVs;

based at least in part on (a) the demand data for item-transport services by the plurality of UAVs, and (b) the battery state information for the plurality of UAVs, determine a respective charge-rate profile for each of one or more of the UAVs; and

send, via the at least one communication interface, instructions to at least one charging hub to cause respective batteries of the one or more of the UAVs to be charged according to the respectively determined charge-rate profiles.

12. The control system of claim 11, wherein the demand data indicates the demand during a given period of time.

13. The control system of claim 11, wherein a plurality of UAV charging hubs are distributed throughout the first geographic area, and wherein the demand data is indicative of demand on per-charging-hub basis.

14. The control system of claim 11, wherein, in order to determine the demand data the computing system is configured to:

determine expected tasks for the plurality of UAVs during a period of time; and

determine fleet-wide power requirements, for the plurality of UAVs, corresponding to the expected tasks.

15. The control system of claim 11, wherein, in order to determine the demand data the computing system is configured to:

determine expected tasks for the plurality of UAVs during a period of time; and

determine a schedule of operation for one or more of the plurality of UAVs to collectively carry out the expected tasks.

16. The control system of claim 11, wherein, in order to determine the battery state information for the plurality of UAVs, the computing system is configured to:

for each of one or more of the UAVs, determine one or more of the following information items: a current battery level of the UAV, a number of charge cycles experienced by a battery of the UAV, an expected number of remaining charge cycles for the battery of the UAV, and a remaining useful life for the battery of the UAV.

17. The control system of claim 11:

wherein the demand data comprises power-consumption data for a set of UAV item-transport tasks, and

wherein, in order to determine the charge-rate profiles, the computing system is configured to:

for each UAV from the plurality of UAVs, apply a cost function to evaluate cost of charging the UAV such that the UAV can perform one or more tasks from the set of tasks during a period of time; and

based on the cost evaluations for the plurality of UAVs, select a set of one or more of the plurality UAVs that are collectively capable of performing the set of tasks during the period of time.

18. The control system of claim 11, wherein, in order to determine the charge-rate profiles, the computing system is configured to:

when the demand data indicates a lower demand level during a time period, then assign a lower charge-rate to one or more selected UAVs from the plurality of UAVs; and

when the demand data indicates a higher demand level during the time period, then assign a higher charge-rate to the one or more selected UAVs.